

Site: MRP#15
ID # DB0981117161
Break: 5.0
Other: OU#1
07DA 9/28/04

LV

RECORD OF DECISION

ALUMINUM COMPANY OF AMERICA SITE
RIVERDALE, IOWA

and

MISSISSIPPI RIVER POOL 15 SITE
near RIVERDALE, IOWA

Prepared by:

United States Environmental Protection Agency
Region VII
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September 2004

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SUPERFUND RECORDS

RECORD OF DECISION

PART 1: THE DECLARATION

1.1 Site Name and Location

Aluminum Company of America Site
State Route 67
Riverdale, Scott County, Iowa
CERCLIS ID # IAD005270160

Mississippi River Pool 15 Site
Pool 15 of the Mississippi River between Federal Lock and Dam (FLD) 14 and FLD 15
Riverdale, Scott County, Iowa
CERCLIS ID # IAD981117161

1.2 Statement of Basis and Purpose

The United States Environmental Protection Agency (EPA) has prepared this decision document to present the selected remedial action for the Aluminum Company of America (Alcoa) site in Riverdale, Iowa and the Mississippi River Pool 15 (MRP15) site, near Riverdale, Iowa. This decision was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Re-Authorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for these sites. The Administrative Record files are located in the following information repositories:

Bettendorf Public Library
2950 Learning Campus Drive
Bettendorf, Iowa

U.S. Environmental Protection Agency
901 N. 5th Street
Kansas City, Kansas

The EPA has coordinated selection of this remedial action with the Iowa Department of Natural Resources (IDNR). The state of Iowa, acting through IDNR, concurs with the selected remedy for the Alcoa site and the selected remedy for the MRP15 site.

1.3 Assessment of Site

The response action selection in the Record of Decision (ROD) for the Alcoa site and the MRP15 site is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Selected Remedy

The selected remedy for the Alcoa site is groundwater containment, which includes operation of the groundwater extraction and treatment system, source area remediation, groundwater monitoring, and institutional controls. The selected remedy for the MRP15 site is monitored natural recovery (MNR) with management of on-site media at the Alcoa-Davenport Works. The major components of the selected remedies include:

- Operation of a groundwater containment/extraction/treatment system;
- Implement institutional controls to prohibit installation of any water supply wells for domestic purposes at the Alcoa facility;
- Implement institutional controls to assure the Alcoa property is used only for industrial purposes;
- Continued listing of the Alcoa site on the Registry of Hazardous Waste or Hazardous Substance Disposal Sites pursuant to Iowa Code §455B.426;
- A Technical Impracticability (TI) zone on the Alcoa property within which the groundwater cleanup is not expected to meet drinking water standards within a reasonable timeframe;
- Monitor groundwater to assure drinking water standards are met outside the TI zone; and
- Monitor natural recovery processes, to include fish and sediments, in MRP15.

1.5 Statutory Determination

The selected remedy for the Alcoa site is protective of human health and the environment, complies with federal and state applicable or relevant and appropriate requirements (ARARs) except where justified by a waiver, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy for the Alcoa site also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment). The treatment system (e.g., air stripper) will effectively reduce volatile organic compound (VOC) concentrations in extracted groundwater but it is also recognized that cleanup of groundwater located in certain portions of the aquifer is not practical. The EPA has determined that restoration of groundwater is not practical based on hydrogeologic and contaminant-related factors, specifically the presence of non-aqueous phase liquid (NAPL) sources in a fractured bedrock aquifer. Based on the inability to restore contaminated groundwater in a reasonable timeframe, a TI waiver for chemical-specific ARARs has been determined to be appropriate for the Alcoa site. Because the selected remedy for the Alcoa site will result in hazardous substances remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is protective of human health and the environment.

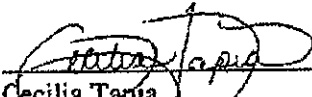
The selected remedy for the MRP15 site is protective of human health and the environment, complies with federal and state ARARs, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy for the MRP15 site also satisfies the statutory preference for treatment as a principle element of the remedy. Because the selected remedy for the MRP15 site will result in hazardous substances remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is protective of human health and the environment.

1.6 Record of Decision (ROD) Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for the Alcoa site and the Administrative Record file for the MRP15 site.

- Chemicals of Potential Concern (COPCs) and their respective concentrations
- Baseline risk represented by the COPCs
- Cleanup levels established for the COPCs and the basis for the levels
- The degree to which source materials constituting principal threats are addressed
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and the ROD
- Potential land and groundwater use that will be available at the site as a result of the selected remedy
- Estimated capital, operation and maintenance, and total present worth costs, and the number of years over which the remedy cost estimates are projected
- Key factors that led to selecting the remedy

1.7 Signature


Cecilia Tapia
Director
Superfund Division
U.S. EPA, Region VII

9/28/04
Date

RECORD OF DECISION

PART 2: DECISION SUMMARY

2.1 Site Name, Location, and Description

This Record of Decision (ROD) has been developed by the United States Environmental Protection Agency (EPA) to select a remedial action alternative for the Aluminum Company of America (Alcoa) site in Riverdale, Iowa and the Mississippi River Pool 15 (MRP15) site, near Riverdale, Iowa. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number for the Alcoa site is IAD005270160. The CERCLIS identification number for the MRP15 site is IAD981117161. The lead agency for both sites is EPA. The support agency for both sites is the Iowa Department of Natural Resources (IDNR). Some of the response actions taken at the sites up to this point have been paid for by the potentially responsible party, including reimbursement for the EPA's oversight costs.

The Alcoa facility is an aluminum sheet and plate rolling mill, known as the Alcoa-Davenport Works, in Scott County, Iowa. The Alcoa-Davenport Works (Figure 1) is located in the town of Riverdale, adjacent to Bettendorf (one of the Iowa-Illinois Quad Cities), on a roughly rectangular, 460-acre tract of land on a gently sloping flood plain adjacent to the Mississippi River. The facility is bound to the north by State Route 67, to the east by the Riverside Power Plant and other industrial use properties, to the west by a petroleum storage facility, other industrial/commercial properties, and residential properties along South Bellingham Street, and to the south by the Mississippi River. The MRP15 site (Figure 2) encompasses approximately ten miles of the Mississippi River, bound by Federal Lock and Dam 14 on the upriver end and Federal Lock and Dam 15 on the downriver end. MRP15 extends from river miles 483 to 493, and the Alcoa facility is located at approximately river mile 489.

2.2 Site History and Enforcement Activities

The Alcoa-Davenport Works manufactures aluminum sheet and plate products and has been in operation since 1948. The facility also produces aluminum ingots as feedstock for the rolling process. The facility has steadily grown and expanded since its original construction and start of operations. Manufacturing processes have resulted in contamination of groundwater and soil at the Alcoa facility and sediments and fish in MRP15. Consequently, areas within the Alcoa facility and portions of MRP15 have been the subject of investigations and evaluations by Alcoa pursuant to a series of administrative orders on consent between Alcoa and the EPA.

Alcoa Site

From 1956 to 1979, Alcoa used an unlined waste oil surface impoundment, located approximately 150 feet from the Mississippi River, for storage of oil and grease, pickling fluids, solvents, and paint wastes. At its greatest extent, the impoundment, now referred to as the Former Waste Disposal Site (FWDS), covered approximately 14 acres and ranged from 8 to 20 feet deep. In 1979, Alcoa determined that the waste oil in the impoundment was contaminated with polychlorinated biphenyls (PCBs) and that action was necessary to control releases. By June 1981, Alcoa had removed all pumpable waste oil and sludge (2.8 million gallons) from the impoundment. The remaining sludge was solidified with cement kiln dust to further control PCB releases. Alcoa installed groundwater monitoring wells around the perimeter of the surface impoundment.

Alcoa conducted groundwater monitoring and sampling between 1980 and 1984 which indicated PCBs and various volatile organic compounds (VOCs) were present in the groundwater in the vicinity of the surface impoundment. In February 1984, Alcoa entered into and the EPA issued an Administrative Order on Consent (AOC), Docket No. 84-F-0004 (1984 AOC). Under terms of the 1984 AOC, Alcoa installed an oil interception and recovery trench to collect oil released from the impoundment before it entered the river. In addition, the impoundment was capped with a low permeability compacted clay. These response actions have helped to reduce the release of PCBs and other contaminants from the former waste oil impoundment to the Mississippi River. In concert with the above activity and pursuant to two consent agreements with the EPA (Toxic Substances Control Act [TSCA] Docket No. VII-87-T-027 and TSCA Docket No. VII-81-T-57), Alcoa subsequently disposed of the PCB-containing oil and cleaned up the three one-million gallon tanks that were used to store the reclaimed oil, as well as, the fuel oil pump house, equipment, and associated piping.

In August 1986, Alcoa entered into and the EPA issued an AOC, Docket No. 86-H-0009 (1986 AOC), pursuant to Section 3013 of the Resource Conservation and Recovery Act of 1976, as amended. Pursuant to the 1986 AOC, Alcoa formulated and implemented a detailed groundwater monitoring plan to further assess the effect of impoundment contaminants on public health and the environment. Monitoring wells were installed and samples confirmed earlier findings that PCBs and VOCs were present in the alluvial aquifer and VOCs were present in the underlying bedrock aquifer in the vicinity of the FWDS.

In August 1989, Alcoa informed the EPA of PCB contamination in soil and groundwater in the northwest portion of the Alcoa facility, near the 86-Inch Continuous Heat Treatment (CHT) Line. In December 1989, Alcoa informed IDNR of VOC contamination, specifically tetrachloroethylene contamination (often referred to as perchlor or PCE), that was discovered during maintenance and excavation activities in the northwest portion of the Alcoa facility near two PCE storage tanks. PCE replaced trichloroethylene (TCE) in the mid-1970s as the degreasing solvent used at the Alcoa facility to clean aluminum prior to entering the Finish Lines. Prior to 1989, an Alcoa process well (i.e., PW-06) was used for industrial water demands at the.

facility and this seasonal use influenced groundwater flow patterns in the western portion of the Alcoa facility. Since 1989, Alcoa has operated PW-06 on a continuous basis to provide hydraulic containment and prevent the offsite migration of contaminated groundwater near the western boundary.

The IDNR requested EPA assistance in January 1990. In July 1990, Alcoa entered into and the EPA issued an AOC, Docket No. VII 90-F-0027 (1990 AOC). Activities being conducted pursuant to the 1984 and 1986 AOCs were incorporated into the 1990 AOC. In addition, the 1990 AOC required the performance of a Facility Site Assessment (FSA) to: 1) identify potential sources of contamination throughout the Alcoa facility due to production or waste management activities; 2) investigate contamination at the 86-Inch CHT Line; and 3) investigate contamination in the PCE storage tank area.

In August 1995, Alcoa entered into and the EPA issued an AOC, Docket No. VII-95-F-0026 (1995 AOC). The 1995 AOC provided a process for assessing risk at the various FSA units, including the 86-Inch CHT Line and the PCE Tanks, primarily focusing on the direct contact risk associated with surface and subsurface soil. The identified FSA units included historical units, current waste management units, and industrial process units (attached Figure 1-2 from the May 14, 2002 Groundwater Remedial Investigation (RI) Report). Alcoa has evaluated a total of 82 FSA units. In some cases, similar type units or units in geographic proximity were investigated as groups to expedite the process. A total of 22 Risk-Based Concentration (RBC) Reports have been developed for all of the units or unit groups. An Ecological Risk Characterization Report for the FSA units has also been developed.

In addition, the 1995 AOC required Alcoa to conduct a RI and feasibility study (FS) for groundwater. The May 2002 Groundwater RI Report is a comprehensive review of all groundwater data and presents a site-wide conceptual understanding of groundwater conditions and quality. The RI Report also includes the Baseline Risk Assessment (BLRA) for groundwater. The results of the RI and groundwater BLRA formed the basis for the remedial alternatives presented in the May 2004 Groundwater FS Report.

Since completion of the sampling that characterized the extent of groundwater contamination associated with the western facility boundary, sub-slab gas sampling has been performed beneath the basements of two unoccupied houses currently owned by Alcoa located adjacent to the groundwater plume. This sampling has identified the presence of organic vapors, primarily PCE, beneath both of the houses that may be related to vapor migration from contaminated groundwater located along the western facility boundary. Additional evaluation of the vapor intrusion pathway is being conducted to help determine if indoor air quality is being adversely affected by the organic vapors. If necessary, appropriate response measures will be implemented. Such measures could include installation of a ventilation system to remove contaminated vapors from living areas within affected houses or other effective action.

In addition to the work conducted pursuant to the AOCs described above, Alcoa has been required to conduct remediation under other environmental regulatory programs as described below. Alcoa has also undertaken plant improvement and maintenance projects on their own accord. Completed and on-going required and voluntary actions that have led to improved environmental conditions at the Alcoa facility, and as a result, within MRP15, include the following.

- Removal of PCB-containing oils from hydraulic lines at the 86-Inch CHT Line (1979).
- Excavation of 400 cubic yards of PCE-contaminated soils near the PCE Tanks and upgrade of containment system (1989).
- Removal of PCB-containing waste oil and sludge (2.8 million gallons) from the former waste oil impoundment (i.e., the FWDS) (1980-81).
- Removal of PCB-contaminated soils from transformer pits and vaults to satisfy National Pollution Discharge Elimination System (NPDES) permit requirements (late 1980s to early 1990s).
- Reduction of PCB levels in all electric transformers as part of the facility PCB Management Plan (early 1980s to early 1990s).
- High-pressure wash to remove PCB-contamination from walls of the industrial waste sewer system (1985) with continued periodic cleaning.
- Removal of various underground storage tanks: Store Room (1991), Foil Mill (1984, 1992), Cold Mill (1991) and associated soils with no further action granted by the Iowa Underground Storage Tank (UST) program.
- Improved PCE vacuum recovery and recycling systems at the Finish Lines.
- Removal of 800 cubic yards of PCB-contaminated soil down to bedrock during decommissioning and demolition of the fuel oil pump house associated with the three one-million gallon tanks (1996).
- Drainage outfalls 001-006 were periodically dredged prior to 1990.
- Cleaning of equipment sump pits throughout the plant and re-piping to industrial waste sewer system (early 1990s).
- Removal of 230 cubic yards of sediment from the lower reach of drainage outfall 006 during weir realignment (1999).

- Removal of 140 cubic yards of debris and soil associated with the Former Light Bulb Dump (2001).
- Periodic removal of PCB-contaminated oil from the 86-Inch CHT Line pits and the 144-Inch Finish Line electrical basement.
- Continuous operation of an Alcoa industrial process well (i.e., PW-06) since 1989 (which serves as a "pump and treat" system that controls offsite migration of bedrock groundwater) and monitoring of the effluent from the treatment system under the Iowa NPDES program.
- Redesign of water reclamation system in 1997 which resulted in significantly reduced wastewater discharge volumes and only treated water is discharged to MRP15 in conjunction with an NPDES permit, except during large storm events when excess rainwater reaches the river via the drainage outfalls.

MRP15 Site

In 1983, the EPA caught and sampled catfish and carp from MRP15. The fish were contaminated with PCBs above 4 parts per million (ppm) which, at that time, was below the Food and Drug Administration (FDA) tolerance level of 5 ppm. PCBs were also found in river sediments. In 1987, the EPA conducted limited fish sampling during a Preliminary Assessment and found carp to have concentrations of PCBs above 4 ppm, which now exceeded the revised FDA tolerance level of 2 ppm. In 1988, Alcoa conducted a more extensive fish sampling event that indicated PCB concentrations in the 2 to 8 ppm range. The IDNR evaluated this data and issued a Fish Consumption Advisory for carp on the Iowa side of MRP15. In this advisory, IDNR notified the public that catfish in MRP15 may also contain levels of PCBs above the FDA tolerance level. In April 1990, IDNR issued a second Fish Consumption Advisory for carpsuckers (also referred to as white carp). The Fish Consumption Advisories recommended not eating carp and carpsuckers taken along the Iowa side of the river.

In addition to the activities for the Alcoa site, the 1990 AOC also required biennial sampling and PCB-analyses of certain fish species from specified sites in MRP15, a continuation of activities begun by Alcoa in 1988. Under the 1990 AOC, fish sampling events were conducted in 1990, 1992, 1994, 1996, and 1998. The analytical results from all the sampling events indicated that levels of PCBs in fish from MRP15 were declining, and, in August 2000, the IDNR lifted the Fish Consumption Advisories for carp and carpsucker because PCBs in fish tissue were below the FDA tolerance limit of 2 ppm total PCBs.

The 1990 AOC also required a sediment investigation in Alcoa's on-site drainage ways (including wetlands) and sediment investigations in MRP15. In addition to PCBs, sediment samples were also analyzed for metals, semivolatile organic compounds (SVOCs), and VOCs. A

mussel identification survey also identified the presence of a few *Lampsilis Higginsii* mussels, an endangered species. Fish sampling data and information from the sediment investigations have been used to develop the Ecological Risk Assessment Report for MRP15, the Human Health Risk Assessment for MRP15, and the FS Report for MRP15.

2.3 Community Participation

Throughout the time that investigation and removal activities have taken place at the site, community involvement activities have occurred. Public participation activities have included media interviews, distribution of fact sheets and analytical results to nearby property owners, and the development of Community Involvement Plans for the Alcoa site and the MRP15 site. The EPA interviewed residents, property owners, local officials, and representatives of local environmental groups on April 10 and 11, 2001. The interview strategy for the Alcoa site primarily focused on individuals and businesses in close proximity to the Alcoa facility. The interview strategy for the MRP15 site focused on individuals and groups in the Quad Cities that use the Mississippi River on a fairly frequent basis. Also, EPA established an Administrative Record file at the Bettendorf Public Library to support a removal action conducted in 2003.

The EPA established an Administrative Record file for the Alcoa site and an Administrative Record file for the MRP15 site at the EPA Region 7 offices and the Bettendorf Public Library to support the remedial action decision for each of the sites. The notice of the availability of these documents was published in the Moline Dispatch, the Rock Island Argus, and the Quad City Times on July 28, 2004. The EPA issued a Proposed Plan for the Alcoa and MRP15 sites on July 28, 2004. A 30-day public comment period began on July 28, 2004, and concluded on August 26, 2004. A public meeting was held on August 19, 2004, at the Riverdale Town Hall in Riverdale, Iowa, to present the Proposed Plan and solicit comments from the public. The EPA's response to comments received during the comment period are included in the Responsiveness Summary, which is a part of this ROD.

2.4 Scope and Role of Operable Unit or Response Action

The remedy selected in this ROD for the Alcoa site and the remedy selected in this ROD for the MRP15 site are anticipated to be the final remedial actions at these two interrelated sites. The selected remedy for the Alcoa site addresses contaminated groundwater, primarily due to the presence of VOCs, and will be conducted under remedial authority. The selected remedy for the MRP15 site addresses contaminated sediments and fish along Alcoa's shoreline, primarily due to the presence of PCBs, and will be conducted under remedial authority. The selected remedy for the Alcoa site and the selected remedy for the MRP15 site take into consideration the improved environmental conditions at the Alcoa facility that are attributable to management of on-site media, and, as a result, the improving environmental conditions along the Alcoa shoreline in MRP15. Management of on-site media consists of previous and ongoing cleanup activities at the Alcoa facility and plant improvement/maintenance projects. Implementation of the selected remedy for the MRP15 site is dependent on continued management of on-site media at the Alcoa

facility and, therefore, groundwater containment and source area remediation for the Alcoa site will also be implemented.

Surface and subsurface soils at the Alcoa site were addressed under removal authority in the FSA Unit process and primarily focused on the direct contact risk that these soils posed to trespassers or workers at the Alcoa site. Alcoa has evaluated a total of 82 FSA units. An Ecological Risk Characterization Report for the FSA units was also developed. Most of the unit investigations determined that particular units or unit groups did not pose an unacceptable risk in the industrial setting and thus did not warrant further action. However, conditions within the Eastern Historical Disposal Site (EHDS) and a portion of Outfall 002 did present a potential risk to wildlife and also presented a potential release of contaminated surface water to MRP15. Accordingly, in 2003, these areas were addressed under removal authority and cleanup activities were completed in a low-lying wetland area within the EHDS and a portion of Outfall 002. Offsite wetlands were created, in cooperation with IDNR, to mitigate the loss of the on-site wetland.

Since completion of the sampling that characterized the extent of groundwater contamination associated with the western facility boundary, sub-slab gas sampling has been performed beneath the basements of two unoccupied houses currently owned by Alcoa located adjacent to the groundwater plume. This sampling has identified the presence of organic vapors, primarily PCE, beneath both of the houses that may be related to vapor migration from contaminated groundwater located along the western facility boundary. Additional evaluation of the vapor intrusion pathway is being conducted to help determine if indoor air quality is being adversely affected by the organic vapors. If necessary, appropriate response measures will be implemented. Such measures could include installation of a ventilation system to remove contaminated vapors from living areas within affected houses or other effective action.

2.5 Site Characteristics

The following groups of chemicals used at the Alcoa facility have been the focus of the investigations and evaluations at the Alcoa and MRP15 sites:

- VOCs - Chlorinated VOCs, for example PCE and TCE, are used at the plant as degreasing solvents to clean metal. Hydrocarbons, another group of VOCs found in gasoline and diesel fuels, are also prevalent throughout the Alcoa facility. Other types of VOCs have been detected in samples collected at the facility, but hydrocarbons, PCE, TCE, and their breakdown products are the most prevalent.
- SVOCs - A subset of SVOCs referred to as polynuclear aromatic hydrocarbons (PAHs) are found at the facility in roofing material, flooring material, and asphaltic road materials. PAHs were also likely contained in some of the hot rolling fluids used historically in the manufacturing process.

- PCBs - Chemical mixtures that were historically used as additives in lubricating oil used for high temperature applications. Oil-filled electrical transformers used PCB-containing dielectric fluids because of their fire-retardant properties. PCBs are no longer used in the manufacturing process, but are found at the facility due to their persistence in the environment.
- Metals - Several different types of metals are used as alloying agents in the manufacture of aluminum products. Metals are also a naturally occurring component of environmental media such as soil and groundwater.

Alcoa Site

The Alcoa Groundwater RI used a phased approach to characterize general groundwater conditions over the entire facility, while also focusing on the facility property boundary. Phase I defined groundwater flow beneath and at the perimeter of the facility. Phase II further defined groundwater flow and quality in areas of concern where groundwater has the potential to migrate beyond the facility property boundary or where nearby groundwater receptors were present, as shown in the conceptual site models (attached Figures 5-1 through 5-4 from the May 14, 2002 Groundwater RI Report) for these key areas at the Alcoa facility.

Many factors can inhibit groundwater restoration and influence the types of remedial alternatives that could be effective. The hydrogeologic limitations presented by the fractured bedrock in this region of Iowa and the widespread occurrence of contamination due to releases of NAPL in the subsurface below the Alcoa facility are two site-specific factors that make extraction or in situ treatment of contaminated groundwater extremely difficult at the Alcoa site. The Alcoa facility and the neighboring properties are connected to the municipal water supply and therefore do not use groundwater from below the Alcoa facility for household purposes or as a drinking water source.

Other environmental media, primarily soil, were addressed in the FSA process. Groundwater and soil at the Alcoa site are discussed below.

Groundwater: Hydrogeology at the Alcoa site has been characterized by more than 200 borings that have been drilled to depths ranging from 2 to 418 feet. Most of these borings have been converted to monitoring wells to evaluate groundwater quality in the alluvial aquifer and the shallow, intermediate, and deep bedrock aquifers. In general, the geology beneath the Alcoa-Davenport Works consists of a layer of unconsolidated sediments underlain by bedrock formations. Across the Alcoa site, the thickness of the unconsolidated sediments ranges from zero feet at the northern end of the property to an estimated 27 feet along the river shoreline. Fill material comprises a significant portion of the unconsolidated sediments at the facility, especially in areas along the southern side of the Alcoa site. The unconsolidated zone consists of compacted gravel, coarse sand, silt, and clay, with concrete and other construction demolition debris. The unconsolidated sediments are underlain by a fractured shallow bedrock unit of

interbedded Silurian-age limestone and shale to a depth of approximately 50 feet below ground surface (bgs). Data from boring logs indicate an undulating shallow bedrock surface that contains numerous depressions but has an overall gentle slope towards the river. Below the shallow bedrock unit the lithology changes and the intermediate and deep bedrock units consist of Devonian-age limestone and dolomite to respective depths of approximately 150 and 400 feet bgs. At 400 feet, the carbonate rocks are underlain by Ordovician-age shales logged by the Iowa Geological Survey as the Maquoketa Shale formation.

The principal water-bearing zones beneath the Alcoa site are found in the shallow, intermediate, and deep bedrock formations. Groundwater in the unconfined shallow bedrock zone is encountered at approximately 20 feet bgs. There is also a surficial water-bearing zone present in some of the unconsolidated deposits, however, the occurrence and flow of groundwater in the unconsolidated water-bearing zone is discontinuous and these deposits are often unsaturated due to infiltration of the shallow groundwater into the underlying bedrock aquifers. In 1989, a year-round pumping program was initiated at the Alcoa-Davenport Works and consequently most groundwater flow in the Silurian and Devonian bedrock aquifer beneath the site flows inward toward the industrial process well (i.e., PW-06) that Alcoa uses to control groundwater flow. Since 2001, the Riverside Power Plant to the east of Alcoa has been operating a process well to obtain water for non-contact industrial purposes. While PW-06 contains groundwater within the bedrock aquifer beneath most of the Alcoa facility, the power plant process well affects the direction of groundwater flow near the eastern boundary of the Alcoa facility. Historically, the flow direction of groundwater in the unconsolidated deposits and the underlying bedrock aquifers under non-pumping (natural) conditions was generally towards the river.

Chlorinated solvents, for example PCE and TCE, can travel very rapidly in the subsurface because they are heavier and less viscous than water. These type of chemicals are referred to as dense non-aqueous phase liquids (DNAPLs) when present at high concentrations in the subsurface. These DNAPLs not only sink vertically downward under gravity, but also can spread laterally with increasing depth as they encounter finer grained layers. These chemicals can also contaminate more than one aquifer by penetrating fractures in the low-permeable geologic layers that separate a shallower aquifer from a deeper aquifer. Thus, DNAPLs can penetrate to great depths and can be very difficult to locate and clean up. PCBs also act as DNAPLs although they are often associated with oils, which may be lighter than water.

Some chemicals are lighter than water. These type of chemicals are referred to as light non-aqueous phase liquids (LNAPLs) when present at high concentrations in the subsurface. LNAPLs are buoyant and typically found at the top of groundwater zones. LNAPLs and water do not mix, but instead, subsurface LNAPLs and water share pore space in soils and rock. This "sharing of pore space" limits the mobility of LNAPLs and complicates their recovery. Lubricating oils, fuel oils, and mineral oils associated with Alcoa's facility are LNAPLs.

Soil: The 1995 AOC provided for a risk-based evaluation of 82 areas located throughout the Alcoa facility that were identified during the FSA. These FSA units were evaluated to provide an understanding of exposure to on-site environmental media, primarily surface and subsurface soil. The contaminated soils associated with many of the FSA units are located underneath buildings. The identified FSA units include historical units, current waste management units, and industrial process units. Historical units consist of the FWDS, inactive waste disposal areas, former USTs, former process areas, and areas of historical activity that are no longer part of industrial processes carried out at Alcoa. Current waste management units include active waste management areas, waste treatment facilities, sewers, and NPDES outfalls. Industrial process units include areas of current industrial activity and comprise over half of the units identified during the FSA. Each of the major mills at Alcoa have industrial process units including the Hot Rolling Mill, Plate Mill, Cold Rolling Mill, Foil Mill (now inactive), Ingot Plant, and Finish Lines.

Analytical data from hundreds of surface soil and subsurface soil samples have been used to support the evaluation of the FSA units. In addition, surface water and sediment samples were evaluated at units where these environmental media are present. Samples were analyzed for PCBs, PAHs, VOCs, and metals. The types of contaminants and contaminant concentrations were dependent on the types of activities associated with the various FSA units. The RBC Reports for the FSA units present the unit-specific data and are available in the Administrative Record file for the Alcoa Site. In accordance with the 1995 AOC, exposure to soil, surface water, and/or sediment available at individual FSA units or FSA unit groupings was evaluated for Alcoa-specific exposure scenarios that included on-site workers, excavation workers, and/or trespassers. With the exception of an area within the EHDS, the investigation and evaluation of the FSA units, as presented in the RBC Reports, determined that exposure to soils or other environmental media does not pose an unacceptable risk with respect to the exposure scenarios that were evaluated and thus cleanup activities were not required.

MRP15 Site

The 1990 AOC also required: 1) investigation of sediments in drainage ways (referred to as outfalls) on the Alcoa facility; 2) investigation of sediments in MRP15 (including wetland areas on the Alcoa facility); and 3) biennial sampling and PCB-analyses of fish from MRP15. Collectively, these various investigative activities comprised the RI for the MRP15 site. An overview of possible exposure media and receptors for MRP15 and the onsite wetlands are shown in the conceptual site models (attached Figures 3-1 and 3-2 from the May 2000 Human Health Risk Assessment Report - MRP15) for the MRP15 site.

The biennial fish investigations have documented a general trend of decreasing PCB concentrations in carp, catfish, and carpsucker caught adjacent to Alcoa facility. There have also been decreases in contaminant concentrations in the MRP15 sediments adjacent to the Alcoa facility. These reductions in sediment and fish concentrations are attributable to the completed and ongoing cleanup activities undertaken at the Alcoa facility, along with naturally occurring

processes that may have facilitated natural recovery of the MRP15 system. MRP15 is the smallest pool in the upper Mississippi River and is characterized by relatively high velocities. These conditions can result in both deposition and erosion of sediments. These physical processes, along with biological and chemical processes in MRP15, are important factors when evaluating remedial alternatives. The sediment and fish associated with MRP15 are discussed below.

Sediment: Investigations were conducted on sediments in MRP15 by the United States Army Corp of Engineers in 1983 and 1984, the U.S. EPA National Enforcement Investigation Center in 1983, and Alcoa during the period from 1988 to 1990. Based on the findings of the earlier sediment studies, the 1990 AOC required a phased sediment investigation to better understand the chemicals of potential concern (COPC) and release mechanism to MRP15. Phase 1 characterized the sediments in the outfalls and wetlands. Phase 2 identified likely sediment depositional areas within MRP15 that may have been impacted by Alcoa. Phase 3 consisted of collecting over 150 sediment samples from these areas, with the primary focus on collection of sediments from along the Alcoa shoreline. In addition to PCBs, these sediment samples were also analyzed for metals, PAHs, and VOCs. The locations of the sediment sampling sites are shown on Figure 2-2 from the May 21, 2004 Feasibility Study for the MRP15 site, which is attached. Supplemental surface water and sediment data were collected in 1996, 1999, and 2003.

Fish: The 1990 AOC required biennial sampling and analyses of PCBs in tissues of certain fish species from specified sites in MRP15, a continuation of activities begun by Alcoa in 1988. Six rounds of fish sampling/analysis have been conducted (1988, 1990, 1992, 1994, 1996, and 1998). The 1990 AOC targeted seven fish species (common carp, flathead catfish, channel catfish, river carpsucker, sturgeon, smallmouth buffalo, and freshwater drum) at five sites (two sites adjacent to the Alcoa facility, one site immediately downstream of the Alcoa facility near the mouth of Duck Creek, and two sites along the Illinois shoreline). Following the 1992 fish sampling event, it was determined that only four species (channel catfish, drum, carpsucker, and carp) were consistently collected during 1988, 1990, and 1992. In 1992, the concentration of PCBs in freshwater drum were below 1 ppm and, therefore, were removed from the sampling target list. Only carp (1994, 1996, 1998), carpsucker (1994, 1996, 1998) and channel catfish (1994, 1996) were collected during subsequent sampling events. The concentration of PCBs in fish collected from the two Illinois sites were similar, and therefore, only one site along the Illinois shoreline has been sampled since 1992. The locations of the fish sampling sites are shown on Figure 2-9 from the May 21, 2004 Feasibility Study for the MRP15 site, which is attached. To document the analytical results, fish study reports were prepared following each fish sampling event. In addition, Alcoa prepared a May 2000 document titled *Evaluation of Biennial Fish Investigations* to assess trends in PCB concentrations for fish collected in MRP15 since 1988. Highlights of these reports include the following.

- PCB concentrations (i.e., the 95% upper confidence limit (UCL) value) in channel catfish filets were below 1 parts per million (ppm) at all sites in 1994 and 1996 (channel catfish were not collected in 1998).

- PCB concentrations (i.e., 95% UCL value) in common carp fillets were below 2 ppm at all sites in 1996 and below 1 ppm at all sites in 1998.
- PCB concentrations (i.e., 95% UCL value) in river carpsucker were below 1 ppm at all sites in 1996 and 1998.

Based on this information, IDNR determined that the Fish Consumption Advisories for carp and carpsucker caught in MRP15 were no longer necessary and in the summer of 2000 the advisories were lifted by the IDNR.

Other biota investigations have included evaluation of mussel communities, benthic biodiversity studies, and whole-body fish analyses for evaluation of ecological receptors.

2.6 Current and Potential Future Land and Water Uses

Alcoa

The Alcoa site is an active industrial facility. The facility is bound to the north by State Route 67, to the east by the Riverside Power Plant and other industrial use properties, to the west by a petroleum storage facility, other industrial/commercial properties, and residential properties along South Bellingham Street, and to the south by the Mississippi River. The Alcoa-Davenport property and property to the northeast is zoned for heavy industry. The residential area along South Bellingham Street is currently zoned for commercial/light industrial land use, but it is anticipated that it will remain residential, although future residential development is unlikely. It is anticipated that the Alcoa facility will remain active and thus the land will continue to be used for industrial purposes associated with aluminum production.

Historically, six industrial process wells (PW-01 through PW-06) provided process water for the plant. However, that practice stopped in 1989. Since then, the industrial wells (usually PW-06 only) are pumped only for hydraulic containment of contaminated groundwater which is treated with an air stripper and discharged to the river under a NPDES permit.

In April 2001, Alcoa signed a Declaration of Restrictive Covenant as part of a No Further Action classification issued by the IDNR regarding the closure of former USTs at the plant. The Restrictive Covenant prohibits the construction and use of drinking water wells within the plant's boundary.

Groundwater is used in some, but not all of the areas adjacent to the Alcoa Site. A summary of groundwater use in these off-site areas and any restrictions that are in place is provided below.

- To the northwest, there are some residences along South Bellingham Road that historically used groundwater as a drinking water source; however, as of March 1999, all residences were connected to the city water supply. Although many of the homes have wells that are abandoned, there are a few wells that could be upgraded and used for outdoor purposes. It was determined that none of the wells contained operable pumps and all but one resident indicated they would not use groundwater for any purpose. This resident stated they would consider using groundwater to hose off their patio if they had an operable pump. Due to the use of city water in the area, it is unlikely that existing water wells will be used to supply drinking water or that future drinking water wells will be installed. In addition, this area is zoned for commercial/light industry by the City of Riverdale, therefore, it is unlikely that new residences will be developed;
- A well was identified at the CITGO INC. bulk fuel terminal (formerly UNOVEN and UNOCAL) located west of the site at 312 South Bellingham Road. The well was abandoned sometime between 1994 and 1999 as recommended in a Site Cleanup report submitted to IDNR, and the terminal was connected to the city water supply. Because Iowa State Plumbing Code, 641.25.6, has restrictions on cross connecting a residential groundwater supply and a city water supply, and the terminal is already connected to city water, it is unlikely that future drinking water wells will be installed at this location.
- Alcoa owns the property south of the fuel terminal (Kelly Cottage), which contains a water well. There are no residents or workers occupying the property and it is only used by Alcoa employees for recreational purposes. It was concluded during the RI that groundwater in the area between Kelly Cottage and the main plant area either flows towards the Alcoa site and PW-06, or towards the river. The Kelly Cottage area will not be considered for potential future residential development because it is characterized as a wetland by the National Wetlands Inventory; is located on the MRP15 flood plain; and is zoned only for heavy industry by the City of Riverdale. Alcoa also owns Chrissey House, a property located across Route 67 that contains a water well. The Chrissey House well is upgradient of the active plant area.
- To the south, there is no potential for groundwater use along the river shoreline, and thus there are no current or former wells in that area. This area is also located on the MRP15 flood plain and zoned only for heavy industry by the City of Riverdale.
- The Mid-American power plant east of Alcoa has an industrial well that is used only for non-contact industrial purposes. Because Iowa State Plumbing Code, 641.25.6, has restrictions on cross connecting a residential groundwater supply and a city water supply, it is unlikely that future drinking water wells will be installed at Mid-American as the plant receives its potable water from the city.

Surface water at the Alcoa site is encountered in the surface water drainage ditches, referred to as Outfalls 001 through 006. Outfall 001 includes surface water in an old quarry pond. Discharge from these outfalls is regulated under a NPDES permit. Except for periods of heavy precipitation, the outfalls generally lack significant flow because lift stations are in place to pump water to the Water Reclamation Facility for treatment and reuse and, as a result, storm water runoff is the primary source of water in the outfalls. The current NPDES permit expires on October 27, 2007, but it is anticipated that a new NPDES permit will be sought by Alcoa and the outfalls will continue to be used for storm water and process water discharge.

Surface water is also present in an Ash Pond Storage Area that is associated with the MidAmerican Energy Company power plant located to the east of the Alcoa facility. The ash pond is located in the southeast portion of the Alcoa facility, along the Mississippi River. It was built in the late 1960s under the authorization of a U.S. Army Corps of Engineers permit and has been continuously operated by MidAmerican Energy Company pursuant to an NPDES Permit. The MidAmerican Energy power plant is an active facility and it is anticipated that the ash pond will be operated under the NPDES permit in the future.

MRP15

There are no current or future land uses associated with the MRP15 site because there are no land areas. There are no current or future groundwater uses associated with the MRP15 site.

Surface water in MRP15 is used for commercial and recreational purposes. Commercial barge traffic is restricted to the channel near the middle of the Mississippi River. Commercial fishing is also conducted in MRP15. MRP15 is an important economic waterway and therefore it is anticipated that similar commercial use will continue in the future. Recreational boating and fishing are enjoyed throughout MRP15. MRP15 provides a recreational outlet for the Quad Cities area and recreational fishing and boating will continue in the future.

2.7 Summary of Site Risks

CERCLA requires the EPA to seek permanent solutions to protect human health and the environment from hazardous substances to the extent practicable. These solutions provide for removal, treatment, or containment of dangerous chemicals so that any remaining contamination does not pose an unacceptable health risk to those who might come in contact with the contaminants. Actual or threatened releases of hazardous substances from the Alcoa site, if not addressed by implementing the response action selected in this ROD, may present a current or potential threat to public health, welfare, or the environment. Actual or threatened releases of hazardous substances from the MRP15 site, if not addressed by implementing the response action selected in this ROD, may present a current or potential threat to public health, welfare, or the environment. This section of the ROD summarizes the results of the human health and ecological risk assessments that have been completed for the Alcoa site and the MRP15 site.

Alcoa Site

Summary of Human Health Risk Assessment

The Base Line Risk Assessment (BLRA) estimates the risks a site poses in the context of current and future reasonable maximum exposure scenarios. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the BLRA prepared by Alcoa to address potential exposure to contaminated groundwater that are included in Section 5 and Appendices L and N of the Groundwater RI Report dated May 14, 2002 (Groundwater RI Report). The figures and tables of data that are referenced throughout this section of the ROD, and attached to the ROD, are taken from the Groundwater RI Report. The Groundwater RI Report is included in the Administrative Record file.

In addition to the BLRA for groundwater, Alcoa has prepared a series of 22 RBC Reports that contain information regarding the evaluation of various media, primarily soil, at the FSA units. The FSA units were addressed under removal authority. For detailed information on the chemicals of concern, exposure assessment, toxicity assessment, and risk characterization for the FSA units refer to the RBC Reports that are included in the Administrative Record file.

In general, the EPA requires or undertakes remedial actions for Superfund sites when the excess carcinogenic (cancer) risk exceeds 10^{-4} . A risk of 10^{-4} represents an increase of one in ten thousand, or 1/10,000, for a reasonable maximum exposure (RME) scenario. This risk represents the lifetime risk of developing cancer as a result of releases from a Superfund site.

Remedial actions may also be conducted at Superfund sites when the hazard index (HI) equals or exceeds one for the RME scenario. The HI is a numeric expression of the noncarcinogenic risk to human health resulting from releases from a Superfund site.

Identification of Chemicals of Potential Concern

Tables L-3-1 and L-3-2 from Appendix L of the Groundwater RI Report, which are attached, present the data for groundwater based on offsite groundwater samples near the northwest facility boundary and onsite groundwater samples at the eastern facility boundary, respectively. For the chemicals retained as COPCs, these tables list the arithmetic mean concentration, the maximum detected concentration, and the exposure point concentration (EPC) value subsequently used in the RME scenario. Table N-4 from Appendix N of the Groundwater RI Report, which is attached, presents the data for groundwater based on onsite groundwater samples collected in a monitoring well at the western edge of the Alcoa facility. This table lists the COPCs and the EPC values.

Exposure Assessment

Exposure refers to the potential contact of an individual (the receptor) with a contaminant. The exposure assessment evaluates the magnitude, frequency, duration, and route of potential exposure. The RME scenarios are developed using current exposure pathways given existing land uses and also exposures which might reasonably be predicted based upon expected or logical future land use assumptions.

The RI evaluated the potential for groundwater to migrate past the facility property boundaries. As such, the BLRA focused on exposure to groundwater at the western facility boundary, the river shoreline, and the eastern facility boundary. The Alcoa risk assessment quantitatively evaluated the potential risk to residential receptors along South Bellingham Street (near the western boundary) and industrial workers along the eastern boundary. The river shoreline areas were not quantitatively evaluated because there are not any relevant receptors. Since 1989, PW-06 has operated on a continuous basis to provide hydraulic containment and prevent the offsite migration of contaminated groundwater near the western boundary and most of the Alcoa shoreline. Along the eastern boundary PW-06 does not provide containment due to distance and the Riverside Power Plant process well.

The BLRA evaluated two risk scenarios for the residential receptor that lives along South Bellingham Street. One was based on groundwater contaminant concentrations from beneath the residences, and another based on concentrations beneath the western edge of the Alcoa facility. The on-site groundwater concentrations were used to assess potential risks under non-containment conditions (i.e., if PW-06 was not pumping). Residential receptors were evaluated for exposure to groundwater due to swimming, car washing, and gardening. Although all of the residents along South Bellingham Street are connected to the municipal water supply, the BLRA also evaluated risk associated with using groundwater as a source of potable water (i.e., ingestion, dermal contact, and inhalation from normal household use). The industrial worker along the eastern facility boundary was evaluated for exposure to groundwater that may result from dermal contact, inhalation, and ingestion. Tables L-1 and N-1 from Appendices L and N of the Groundwater RI Report, which are attached, show the groundwater exposure scenarios and pathways considered.

The vapor intrusion pathway into indoor air was also evaluated for residential receptors along S. Bellingham Street. Additional evaluation of the vapor intrusion pathway will be conducted, and if necessary, appropriate response measures will be implemented.

As previously stated, the FSA unit evaluation process used the site-specific exposure scenarios developed for the 1995 AOC. These included the on-site worker, excavation worker (construction worker and repair worker scenarios), and a shoreline trespasser. These scenarios are designed to provide an evaluation of exposure to on-site environmental media, primarily due to direct contact with soil and outfall sediments.

Toxicity Assessment

Tables L-6-1 and N-5 from Appendices L and N of the Groundwater RI Report, which are attached, provide carcinogenic risk information for oral and dermal exposure to the COPCs in groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in the assessment have been extrapolated from oral values. An adjustment factor is applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. Tables L-6-2 and N-5 from Appendices L and N of the Groundwater RI Report, which are attached, provide carcinogenic risk information for inhalation exposure to the COPCs in groundwater.

Tables L-5-1 and N-5 from Appendices L and N of the Groundwater RI Report, which are attached, provide noncarcinogenic risk information for oral and dermal exposure to the COPCs in groundwater. As was the case with carcinogenic data, dermal reference doses are not available. The dermal reference doses can be extrapolated from oral values, applying an adjustment factor as appropriate. Tables L-5-2 and N-5 from Appendices L and N of the Groundwater RI Report, which are attached, provide noncarcinogenic risk information for inhalation exposure to the COPCs in groundwater.

Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

Where: risk = a probability (e.g., 2×10^{-5}) of an individual's developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as (mg/kg-day)⁻¹

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk (ELCR) of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. In general, the EPA requires or undertakes remedial actions for Superfund sites when the excess carcinogenic (cancer) risk exceeds 1 in 10,000. Cancer risks are summed across all chemicals of concern and all exposure pathways that contribute to exposure of an individual in a given population.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). A HQ of less than one indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all COPCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. A HI of less than one indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. A HI greater than one indicates that site-related exposures may present a risk to human health.

Tables L-9-1 through L-9-6 and Tables N-7 through N-10 Appendices L and N of the Groundwater RI Report, which are attached, present the carcinogenic and noncarcinogenic risk estimates for each of the RME scenarios. These risk estimates are based upon a reasonable maximum exposure and were developed by taking into account various assumptions about the frequency and duration of a receptor's exposure to groundwater, as well as the toxicity of the COPCs. Each table shows the total risks associated with direct exposure to COPCs in the specified media for a particular timeframe, receptor population, and receptor age.

Based on groundwater contaminant concentrations from below the residences (i.e., using data from a former residential water well and data from an off-site monitoring wells located within the residential area on South Bellingham Street), and existing PW-06 pumping conditions, the only unacceptable risks would be to a resident that uses groundwater for potable purposes. For this exposure scenario the ELCR is 4×10^{-6} , falling within the 10^{-4} to 10^{-6} risk range, and the HI is 1.1, slightly above the target HI of 1. The inhalation pathway, and especially inhalation of chloroform, which is not a site-related contaminant, was the major contributor.

To determine the potential risks posed to residential receptors along South Bellingham Street in the absence of groundwater containment (i.e. under natural groundwater flow conditions), groundwater concentrations from an on-site monitoring well were used. This results in a calculated risk of 5×10^{-3} and an HI of 33. PCE, TCE, 1-2-DCE, and vinyl chloride are specific constituents that pose potential risks greater than 10^{-4} and/or hazards above 1. There are no active domestic wells on the Alcoa site or along S. Bellingham Street.

An evaluation of the FSA units concluded that there are no unacceptable risks to workers or trespassers from soils or other environmental media based on the exposure scenarios evaluated in the RBC Reports. A Short-Term Management Plan (STMP) will be developed to address some of the FSA units. The purpose of the STMP is to document FSA units that have insufficient data because environmental media is currently inaccessible and/or have the potential for future land use changes that could result in subsequent changes to conclusions regarding potential risk. Further protection to workers is provided by Occupational Safety and Health

Administration requirements and Alcoa's facility-wide general safety program that addresses environmental aspects (including sampling) of maintenance and plant improvement projects.

Summary of Ecological Risk Assessment

Approximately twenty-five percent of the 460 acre Alcoa site consists of vegetated or partially vegetated areas. However, fragmentation caused by historic development of the Alcoa facility has resulted in few vegetated areas of sufficient size and resource quality to support and sustain an ecological community. Along most of the acreage immediately adjacent to the Mississippi River are patches of regrowth forest, shrub/scrub, and open-field cover types that constitute modified natural areas. These terrestrial areas, along with the aquatic and semi-aquatic habitats associated with the outfalls and a wetland area, were evaluated as documented in the September 2001 Ecological Risk Characterization Report for the FSA units. Groundwater discharge into the surface water of the outfalls and/or onsite wetlands, where ecological receptors may be present, was also identified as a potential pathway and evaluated. Summaries of the chemicals of potential ecological concern (COPECs), including frequency of detection, maximum concentration detected, screening benchmark, and rationale for selection are presented in Tables 2-1 through 2-4 from the September 2001 Ecological Risk Characterization - FSA Units, which are attached.

Ecological receptors that were evaluated in the process included the little brown bat, red fox, American kestrel, red-tailed hawk, great blue heron, mallard, and the raccoon. A summary of the ecological receptors with respect to the different types of forage areas and risk hypotheses is presented in Table 2-7 of the September 2001 Ecological Risk Characterization - FSA Units, which is attached.

It was concluded that potential ecological risks are low in the terrestrial areas and the outfalls. However, the Ecological Risk Characterization also concluded that elevated concentrations of PCBs warranted a removal action in the vicinity of a land-locked wetland area between outfall 002 and outfall 003 in the EHDS. In 2003, the wetland area in the EHDS was filled, graded, and vegetated to interrupt exposure pathways associated with direct exposure to contaminated surface water and sediment. Alcoa has created/restored approximately 15 acres of wetland adjacent to the Princeton State Wildlife Refuge to mitigate the loss of this approximately 3.8 acre wetland area.

MRP15 Site

Summary of Human Health Risk Assessment

The BLRA estimates the risks a site poses in the context of current and future reasonable maximum exposure scenarios. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. Similar to a BLRA, Alcoa prepared a Human Health Risk Assessment (HHRA) Report for MRP15 utilizing data collected during the sediment and fish investigations. This section of the ROD summarizes the results of the May 2000 HHRA for MRP15. The figures and tables of data that are referenced throughout this section of the ROD, and attached to the ROD, are taken from Appendix C of the HHRA Report for MRP15. The HHRA Report for MRP15 is included in the Administrative Record file.

Identification of Chemicals of Potential Concern

Tables 3-1 through 3-6 from Appendix C of the May 2000 Human Health Risk Assessment, which are attached, present the data for surface water, sediment and fish tissue for the MRP15 site and onsite wetlands. For the chemicals retained as COPCs, these tables list the arithmetic mean concentration, the maximum detected concentration, and the exposure point concentration (EPC) value subsequently used in the RME scenario. PCBs were retained as COPCs in surface water, sediments, and fish. Benzo(a) pyrene was also retained as a COPC in sediments.

Exposure Assessment

The Human Health Risk Assessment for MRP15 evaluated the risk to human health based on the following exposure scenarios that were considered representative of site-specific conditions with respect to MRP15. Table 1 from Appendix C of the May 2000 Human Health Risk Assessment, which is attached, shows the groundwater exposure scenarios and pathways considered for the MRP15 site. The following receptor scenarios were quantitatively evaluated:

- Recreational boat fishermen - recreational anglers that catch and consume fish from shoreline fishing near the Alcoa facility and may also contact COPCS in sediments and surface water when wading to the shoreline.
- Recreational shoreline fishermen - recreational anglers that catch and consume fish from shoreline fishing near Duck Creek.
- Shoreline trespasser - an individual that may trespass onto Alcoa property and contact contaminated sediments and surface water within on-site wetlands.

For the recreational angler fishing scenarios, uncertainties arise in the assumptions for exposure. For example, how much and how often fish are consumed, the type of fish consumed, and the preparation method. To address these uncertainties, two principal sources of information were used: 1) a comprehensive study of sport fishing in Iowa (1994), sponsored by IDNR; and 2) sport fishery statistics for MRP11 and 13 (1997) by IDNR. The data reported in these surveys were considered to be relevant for use in the MRP15 risk assessment because the surveyed population (recreational fishermen from Iowa) and the creel information (amount and type of self-caught fish from the Mississippi River) represent fishing habits and information derived from local and regional sources.

Toxicity Assessment

Table 6-1 from Appendix C of the May 2000 Human Health Risk Assessment, which is attached, provides carcinogenic risk information for oral and dermal exposure to the COPCs in sediments and fish from the MRP15 site. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in the assessment have been extrapolated from oral values. An adjustment factor is applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route.

Table 5-1 from Appendix C of the May 2000 Human Health Risk Assessment, which is attached, provides noncarcinogenic risk information for oral and dermal exposure to the COPCs in sediments and fish from the MRP15 site. As was the case with carcinogenic data, dermal reference doses are not available. The dermal reference doses can be extrapolated from oral values, applying an adjustment factor as appropriate.

Risk Characterization

Tables 9-2 RME, 9-4 RME, and 9-6 RME from Appendix C of the May 2000 Human Health Risk Assessment, which are attached, present the carcinogenic and noncarcinogenic risk estimates for each of the RME scenarios. These risk estimates are based upon a reasonable maximum exposure scenario for a recreational angler fishing from a boat, a recreational angler fishing from the shoreline, and a trespasser to Alcoa's shoreline. Each table shows the total risks associated with direct exposure to COPCs in the specified media for a particular timeframe, receptor population, and receptor age. The HI value in these tables are based on the assumption that the RfD for Aroclor 1254 was applicable to each individual Aroclor when estimating the non-carcinogenic hazard associated with total PCBs.

For the recreational boat fisherman exposure scenario, the ELCR is 4.2×10^{-5} , falling within the 10^{-4} to 10^{-6} risk range, and the HI is 2.2, above the target HI of 1. For the recreational shoreline fisherman exposure scenario, the ELCR is 4.7×10^{-5} and the HI is 2.5, also above the target HI of 1. For the shoreline trespasser scenario, the ELCR is 1.5×10^{-6} and the HI is 0.039, below the target HI of 1.

In summary, no significant carcinogenic risks or noncarcinogenic hazards were identified for the shoreline trespasser. Potential cancer risks for the fishermen were within the acceptable 10^{-4} to 10^{-6} risk range. However, noncarcinogenic hazard indices for both fishermen scenarios exceed 2. The principal pathway of concern contributing to the risk to fishermen is the ingestion of self-caught fish from MRP15.

Summary of Ecological Risk Assessment

Alcoa conducted an ecological risk assessment for MRP15 utilizing data collected during the sediment and fish investigations. The ecological risk assessment was conducted using the methodology described in the Ecological Risk Assessment Guidance for Superfund (ERAGs) and Guidelines for Ecological Risk Assessment. This process was documented in the following reports for the MRP15 site: 1) Chemicals of Potential Concern and Chemicals of Potential Ecological Concern Memorandum; 2) Ecological Problem Formulation Memorandum; and 3) Ecological Risk Assessment Report.

Chemicals of Potential Ecological Concern

Chemicals of potential ecological concern (COPECs) were identified by comparing chemical concentrations in surface water and sediments in MRP15 and the wetlands to ecotoxicological screening benchmarks. Table 2-2 from the November 2002 Ecological Risk Assessment - MRP15, which is attached, lists the physical and chemical properties of the COPECs for MRP15 and the wetland area adjacent to the Mississippi River between outfall 004 and outfall 005.

Exposure Assessment

In the ecological risk assessment, receptor groups that were assessed included benthic macroinvertebrates and carnivorous birds and mammals, including river otters, mink, great blue heron, and belted kingfisher. Figure 2-9 from the November 2002 Ecological Risk Assessment - MRP15, which is attached, presents the conceptual model for direct exposure pathways to COPECs in MRP15 and the wetland. Figure 2-10 from the November 2002 Ecological Risk Assessment - MRP15, which is attached, presents the conceptual model for ingestion pathway exposures to PCBs in MRP15 and the wetland. Ecological receptors evaluated in the MRP15 ecological risk assessment included benthic macroinvertebrates, the spotted sandpiper, the kingfisher, the great blue heron, the mallard duck, mink, and otter.

Bald eagles, designated as a threatened species, occur in the vicinity of MRP15 in the winter, particularly downstream from the locks and dams (i.e., 5 miles upstream and 5 miles downstream). Using the great blue heron as a surrogate receptor for the bald eagle and assuming only carp in the diet, it was concluded that PCB-contaminated fish adjacent to the Alcoa facility do not pose unacceptable risks to bald eagles. A diverse assemblage of mussels, including a few *Lampsilis Higginsii* mussels, an endangered species, and numerous *Ellipsaria lineolata*, a

threatened species, was observed in the Mississippi River along and immediately downstream from the Alcoa facility. Species richness of mussels collected adjacent to the Alcoa facility is comparable to other mussel investigations reported in MRP15. However, mussels are limited to microhabitats, and there are no true "mussel beds" adjacent to Alcoa. Mussels collected adjacent to Alcoa during the remedial investigation did not contain measurable concentrations of PCBs, an improvement when compared to detectable concentrations of PCBs in mussels collected in the early 1980s.

Ecological Effects Assessment

In the Ecological Problem Formulation Memorandum, four assessment endpoints were identified for MRP15 and in the wetland area adjacent to the Mississippi River between outfall 004 and outfall 005. In MRP15: 1) survival, growth, or reproduction of benthic invertebrates due to exposures of carbon disulfide, phenol, carbazole, PAHs, copper, lead, manganese, or zinc; and 2) reproduction and/or development of carnivorous birds, river otters, and mink due to ingestion of animals and sediments containing PCBs. In the wetland area: 1) reduced survival of epifaunal benthic invertebrates due to direct exposure to sediments containing carbazole, dibenzofuran, PAHs, chromium, copper, manganese, or zinc; and 2) reproduction and/or development of carnivorous birds due to ingestion of animals and sediments containing PCBs.

Ecological Risk Characterization

The MRP15 ecological risk assessment concluded that there was no significant risks to carnivorous birds and mammals. However, the United States Fish and Wildlife Service expressed concern relative to mink in the vicinity of Duck Creek. Potential risks to benthic invertebrates were identified on a localized basis, but it was concluded in the November 2002 Ecological Risk Assessment for MRP15 that the ecological significance of appears to be minimal based on the small size of the area and anticipated further reductions in contaminant concentrations. These conclusions were further substantiated by sediment data collected in 2003, in which reductions in PCBs and PAHs were observed.

No active remedial needs were identified for MRP15 based on the ecological risk assessment results. However, observations of sediment depositional processes (i.e., sediment bed stability) is warranted from an ecological perspective to ensure that erosive processes do not result in re-exposure of COPECs. Also, to address the potential risk to mink discussed above, analytical data obtained during future fish sampling events would be used to monitor health from both a human and ecological perspective.

2.8 Remedial Action Objectives

Remedial action objectives (RAOs) provide a general description of the goals that the response action is expected to accomplish.

Alcoa Site

The general RAOs for the Alcoa Site are to: 1) prevent exposure to groundwater containing carcinogens and noncarcinogens in excess of ARARs; and 2) integrate previous or ongoing source and groundwater response actions into a remedial strategy that reduces or eliminates the migration of contaminants from the Alcoa facility to offsite areas, including MRP15.

It was necessary to develop more specific RAOs with respect to different portions of the groundwater plume as follows: 1) manage and monitor the migration of on-site groundwater that contains site-related contaminants at levels above ARARs to prevent contaminant migration in the vicinity of South Bellingham Street; 2) manage and monitor the migration of on-site groundwater to prevent the discharge of site-related contaminants at levels that would result in an unacceptable risk to surface water receptors in MRP15; and 3) monitor the migration of COPCs in groundwater that currently flows off the facility to the east to ensure concentrations remain below ARARs and manage the offsite flow if groundwater concentrations exceed ARARs.

The EPA's expectation in the NCP is to return groundwater to its beneficial re-use wherever practicable and within a reasonable timeframe given the specific site conditions. When there are conditions that may inhibit groundwater restoration, the EPA has established guidance and a mechanism to evaluate the technical impracticability of restoring groundwater to meet ARARs (e.g. Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act). Alcoa prepared a Technical Impracticability (TI) Evaluation Report as part of the Groundwater FS Report for the Alcoa site to evaluate in-situ treatment technologies. The EPA has determined that restoration of groundwater in a reasonable timeframe is not practical based on hydrogeologic and contaminant-related factors, specifically the presence of NAPL sources in a fractured bedrock aquifer. All of the remedial alternatives that were evaluated in the Groundwater FS for the Alcoa Site, except the No Action alternative, would require a TI ARARs Waiver. The spatial extent (i.e., TI zone) over which the ARAR waiver would apply will be in an area that lies within the Alcoa property and is depicted in Figure 3 (as adapted from Figure 6-1 of the TI Evaluation Report that was included as Appendix A to the May 2004 Groundwater FS).

MRP15 Site

The RAOs for the MRP15 Site are to: 1) reduce PCB concentrations in fish to levels that are protective of human health and the environment; and 2) monitor natural recovery processes, including sediment depositional processes, to evaluate the potential for future exposures to contaminated sediments.

2.9 Description of Alternatives

Alcoa Site

A Feasibility Study was conducted to develop and evaluate remedial alternatives for the Alcoa Site. Remedial alternatives were assembled from applicable remedial process options and were initially evaluated for effectiveness, implementability, and cost. The alternatives meeting these criteria were further evaluated and compared to the nine criteria required by the NCP. The NCP also requires that a no action alternative be considered. The no action alternative serves primarily as a point of comparison for the other alternatives. Three alternatives, including the no action alternative, were considered. These alternatives are listed in the table below.

REMEDIAL ALTERNATIVES - Alcoa Site	
1	No Action
2	Groundwater Containment, which includes Groundwater Extraction and Treatment, Source Area Remediation, Groundwater Monitoring, and Institutional Controls
3	Modified Groundwater Containment, which includes Groundwater Extraction and Treatment, Source Area Remediation, Groundwater Monitoring, and Institutional Controls

ALTERNATIVE 1 - No Action

The NCP requires that the EPA consider a no action alternative against which other remedial alternatives can be compared. Under this alternative for the Alcoa site, no further action would be taken to monitor, control, or remediate the groundwater contamination. In other words, there would be no effort to actively manage on-site media and groundwater containment/extraction at PW-06 would be discontinued. There is no cost associated with this alternative.

The expected outcome of Alternative 1 is that RAOs for the Alcoa site will not be met. The potential for migration of contaminated groundwater to offsite areas and/or vapor intrusion issues along South Bellingham Street is possible if the existing groundwater containment/extraction/treatment system would be discontinued. If groundwater containment does not occur, and there were no institutional controls in place to control the installation of domestic water wells, there is the potential for exposure to contaminated groundwater. Also, exposure to contaminated groundwater could occur if no institutional controls were in place to limit the Alcoa property to industrial uses and prevent installation of drinking water wells on the Alcoa facility. Without monitoring, it would be difficult to determine if contaminants were migrating from the Alcoa facility.

ALTERNATIVE 2 – Groundwater Containment, which includes Groundwater Extraction and Treatment, Source Area Remediation, Groundwater Monitoring, and Institutional Controls

To contain and treat contaminated groundwater, Alternative 2, as described in the Groundwater FS, includes operation and maintenance of the existing groundwater extraction well (PW-06) and air stripper. The air stripping treatment system removes VOCs from contaminated groundwater. The treated groundwater would be either discharged to the Mississippi River at levels protective of human health and the environment or recycled for plant re-use under the guidelines of the Davenport Water Pollution Control Pretreatment program. Two other industrial process wells (i.e., PW-01 and PW-05) have been connected to the existing groundwater containment/extraction/treatment system to serve as backup to PW-06, if needed. The completed and on-going source area remediation activities have been previously described, including the limited on-going source area remediation that consists of the periodic removal of PCB-contaminated oil from the 86-Inch CHT Line pits and the 144-Inch Finish Line electrical basement. A Long-Term Monitoring Plan (LTMP) will be developed during the Remedial Design to provide for the collection of water level data and groundwater samples for subsequent laboratory analyses. The LTMP will also address the residential wells along South Bellingham that are not currently being used and the well located on Alcoa property to the east of the Alcoa facility (i.e., Kelly Cottage). The LTMP will be based on information obtained during the RI, such as source locations, groundwater contaminants, and groundwater flow.

Alternative 2 also involves the implementation of institutional controls. Institutional controls are non-engineered methods intended to affect human activities in such a way as to restrict or reduce exposure to hazardous substances. This may include deed restrictions, covenants, environmental easements, and ordinances. In addition, access restrictions such as the perimeter fence and Alcoa's security guards prevent unauthorized personnel from entering the site, which in turn prevents exposure to contaminated media. The STMP will provide an additional tool for identification and management of certain FSA units. Layering of institutional controls is an effective approach and the specific institutional controls for the Alcoa Site would include the following existing and additional controls.

- Iowa State Plumbing Code, 641.25.6, has restrictions on cross-connecting a residential groundwater supply and a city water supply. Residences along South Bellingham Street and neighboring businesses are connected to the city water supply and therefore existing or future drinking water wells cannot be connected to the city water supply.
- Local zoning ordinances are in place through the town of Riverdale. The Alcoa-Davenport property and property to the northeast is zoned for heavy industry. The current residential area along South Bellingham Street is zoned commercial/light industry.

- An existing Declaration of Restrictive Covenants filed with the Scott County Recorder's office that prohibits construction of drinking water wells within the entire fenced boundary of the Alcoa facility as part of an underground storage tank closure with IDNR. Additionally, Alcoa will execute and record against the Alcoa property an Environmental Protection Easement and Declaration of Restrictive Covenants enforceable by the state of Iowa with the EPA as a third party beneficiary so that EPA could also enforce the restrictions. The Environmental Protection Easement will include requirements that will prohibit the installation of drinking water wells at the Alcoa facility.
- Continued listing of the Site on the Registry of Hazardous Waste or Hazardous Substance Disposal Sites pursuant to Iowa Administrative Code 455B.426. The Iowa Administrative Code 148.6(5) requires written approval of the Director of the IDNR prior to any substantial change in the use of the listed site. In addition, written approval is also required to sell, convey, or transfer title of the listed site.

The estimated cost of this alternative is between \$2.3 million and \$2.7 million. These costs assume operation and maintenance (O&M) costs over a period of 30 years. The EPA has determined that it is difficult to accurately project O&M costs beyond 30 years. Since it is anticipated that O&M will exceed this 30-year period, the costs may be significantly more than the estimated costs. There are also substantial O&M costs associated with plant security, particularly the guards. However, the site security costs included in Alcoa's Groundwater FS Report are not included in the above estimate because security at the Alcoa facility is required regardless of the environmental issues.

The expected outcome of Alternative 2 is that there will not be any ingestion of contaminated groundwater in areas outside the TI zone or in areas within the TI zone. Groundwater containment provided by PW-06 will prevent migration of contaminated groundwater from the TI zone to areas outside the TI zone and therefore prevent contaminant migration to offsite areas. In addition, groundwater extraction and treatment will reduce contaminant concentrations. The limited on-going source area remediation that consists of the periodic removal of PCB-contaminated oil from the 86-Inch CHT Line pits and the 144-Inch Finish Line electrical basement will not have an appreciable effect on reducing groundwater contaminant concentrations but will result in less contaminant loading to the subsurface. The groundwater monitoring component will provide the necessary information to assure that the groundwater containment system is effectively controlling groundwater migration. Groundwater monitoring will also be used to assess the quality of the groundwater in areas outside and inside the TI zone, although restoration of the aquifer within the TI zone to drinking water standards in less than 100 years is unlikely. Institutional controls will be used to control exposure to groundwater in offsite areas and onsite areas.

ALTERNATIVE 3 - Modified Groundwater Containment, which includes Groundwater Extraction and Treatment, Source Area Remediation, Groundwater Monitoring, and Institutional Controls

Alternative 3, as described in the Groundwater FS, includes the source remediation, groundwater monitoring, and institutional controls described in Alternative 2 above, however, the groundwater containment/extraction system would be modified. Potential modifications would include: 1) using a different extraction rate at PW-06 based on results from additional testing; and 2) using other existing industrial process wells (e.g., PW-01 and/or PW-05) and/or the installation of an additional recovery well near the western boundary of the facility to augment recovery of contaminants. The air stripping treatment system and discharge of treated water would remain consistent with Alternative 2.

Alcoa's Groundwater FS Report indicates that the estimated cost of this alternative is between \$2.6 million and \$3.0 million. These costs assume O&M costs over a period of 30 years. The EPA has determined that it is difficult to accurately project O&M costs beyond 30 years. Since it is anticipated that O&M will exceed this 30-year period, the costs may be significantly more than the estimated costs. As with Alternative 2, there are substantial O&M costs associated with plant security, particularly the guards. However, the site security costs included in Alcoa's Groundwater FS Report are not included in the above estimate because security at the Alcoa facility is required regardless of the environmental issues.

The expected outcome of Alternative 3 is the same as for Alternative 2. Groundwater containment provided by a modified system would also prevent migration of contaminated groundwater from the TI zone to areas outside the TI zone and therefore prevent contaminant migration to offsite areas. All other components of the remedy would have the same expected outcome as described for Alternative 2.

MRP15 Site

A FS was conducted to develop and evaluate remedial alternatives for the MRP15 site. Remedial alternatives were assembled from applicable remedial process options and were initially evaluated for effectiveness, implementability, and cost. The alternatives meeting these criteria were further evaluated and compared to the nine criteria required by the NCP. The NCP also requires that a no action alternative be considered. The no action alternative serves primarily as a point of comparison for the other alternatives. Three alternatives, including the no action alternative, were considered. The alternatives are listed in the table below.

REMEDIAL ALTERNATIVES - MRP15 Site	
1	No Action
2	No Action with Management of On-site Media at the Alcoa-Davenport Works
3	Monitored Natural Recovery with Management of On-site Media at the Alcoa-Davenport Works

ALTERNATIVE 1 - No Action

As stated above, the NCP requires that the EPA consider a no action alternative against which other remedial alternatives can be compared. Under the No Action alternative for the MRP15 site, no active remediation of sediments in MRP15 would occur. In addition, monitoring of fish and sediments in MRP15 would not be implemented.

It is also assumed that no action would be taken at the Alcoa site to monitor, control, or remediate the groundwater contamination. In other words, there would be no effort to actively manage on-site media at the Alcoa site and the existing groundwater containment/extraction/treatment system at the Alcoa site (i.e., PW-06) would be discontinued, resulting in contaminant migration to MRP15 and potential adverse impacts within MRP15. It has been demonstrated that natural recovery processes are occurring in MRP15, however, the No Action alternative does not provide for any monitoring to determine whether natural recovery processes will continue to be effective in the future or to determine whether PCB concentrations in fish are at acceptable health-based levels. There is no cost associated with this alternative.

The expected outcome of Alternative 1 for the MRP15 site would be an increase in contaminant in surface water, sediments, and fish in MRP15. The RAO to reduce PCB concentrations in fish would likely not be met if PCB-loading to MRP15 were to occur due to the lack of controls at the Alcoa facility. It is also likely that natural recovery processes that are occurring in MRP15 would be adversely impacted if levels of PCBs, PAHs, and other contaminants were to increase as a result of discontinuing management of on-site media at the Alcoa facility.

ALTERNATIVE 2 - No Action with Management of On-site Media at the Alcoa-Davenport Works

Under Alternative 2, as described in the MRP15 FS, no action would be taken in MRP15. Active remediation and/or monitoring would not be required.

However, the ability to effectively manage the sources of contamination associated with the Alcoa facility is important to the success of Alternative 2. Implementation of Alternative 2 for the MRP15 site is dependent on continued management of on-site media at the Alcoa facility and, therefore, assumes that Alternative 2 or Alternative 3 for the Alcoa site will also be implemented. Management of on-site media is described above in Alternative 2 for the Alcoa site. The release of PCBs and other contaminants to MRP15 from the Alcoa facility have been essentially eliminated or controlled as a result of remedial and source management activities already implemented by Alcoa and this alternative would provide for the continuation of these activities. Since there is no active remediation or monitoring associated with this alternative, there are also no costs.

The expected outcome of Alternative 2 for the MRP15 site is that sediment concentrations and fish tissue concentrations will remain the same or decrease as natural recovery processes continue. However, without monitoring it will be difficult to determine if concentrations in sediment and fish are protective of human health and the environment.

ALTERNATIVE 3 -- Monitored Natural Recovery with Management of On-site Media at the Alcoa-Davenport Works

Alternative 3, as described in the MRP15 FS, provides for monitored natural recovery (MNR), but active remediation of sediments would not be required. MNR is a cleanup method that uses ongoing, naturally occurring, biological, chemical, or physical processes to contain, destroy, or otherwise reduce the bioavailability or toxicity of contaminants in sediments. For Alternative 3, MNR would include the evaluation of sediment bed stability in the areas along the Alcoa shoreline and in the wetland area adjacent to the Alcoa shoreline between outfall 004 and outfall 005. MNR would also include collection of fish from locations along the Alcoa shoreline and, for comparison, from areas not impacted by Alcoa (i.e., reference areas). An MNR program will be developed during the subsequent Remedial Design to provide for the collection of appropriate analytical data and information to monitor natural recovery processes along Alcoa's shoreline. Monitoring is performed as part of MNR to demonstrate that contaminant reduction is occurring, and that the reduction is achieving the RAOs.

However, the ability to effectively manage the sources of contamination associated with the Alcoa facility is important to the success of Alternative 3. Implementation of Alternative 3 for the MRP15 site is dependent on continued management of on-site media at the Alcoa facility and, therefore, assumes that Alternative 2 or Alternative 3 for the Alcoa site will also be implemented. Management of on-site media is described above in Alternative 2 for the Alcoa site. The release of PCBs and other contaminants to MRP15 from the Alcoa facility have been essentially eliminated or controlled as a result of remedial and source management activities already implemented by Alcoa and this alternative would provide for the continuation of these activities.

Alternative 3 has costs for data collection and reporting associated with MNR activities. Details of the MNR program will be developed during the Remedial Design, however, for costing purposes it was assumed that a minimum of three fish tissue and sediment monitoring events will be necessary at \$120,000 per event. It is anticipated that one event would take place following issuance of the ROD to serve as a baseline event, and subsequent events would occur during the fourth year of five-year review periods.

The expected outcome of Alternative 3 for the MRP15 site is that sediment concentrations and fish tissue concentrations will remain the same or decrease as natural recovery processes continue. Monitoring will provide the necessary information to determine if concentrations in sediment and fish are protective of human health and the environment.

2.10 Comparative Analysis of Alternatives

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. The nine evaluation criteria listed in Section 300.430 of the NCP are: 1) overall protection of human health and the environment; 2) compliance with applicable, relevant and appropriate requirements (ARARs); 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility, or volume of contaminants through treatment; 5) short-term effectiveness; 6) implementability; 7) cost; 8) state/support agency acceptance; and 9) community acceptance. This section of the ROD profiles the relative performance of each alternative against the nine criteria for the Alcoa site and the MRP15 site. The nine evaluation criteria are discussed below for each site. For the Alcoa site, a detailed evaluation of the original three alternatives against the nine criteria can be found in the Alcoa Groundwater FS Report. For the MRP15 site, a detailed evaluation of the original three alternatives against the nine criteria can be found in the MRP15 FS Report.

Alcoa Site

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through institutional controls, engineering controls, and/or treatment.

All of the alternatives, except the no action alternative, would adequately protect human health and the environment from the contaminants in soil and groundwater and would meet all of the RAOs for the Alcoa site. Alternative 1, the no action alternative, assumes that the existing groundwater containment/extraction/treatment system would be discontinued and a groundwater monitoring program would not be implemented. These conditions could lead to the potential for exposure to contaminated groundwater in offsite areas and/or vapor intrusion issues offsite. The RAOs established for the Alcoa site would not be met.

Alternatives 2 and 3 would provide overall protection of human health and the environment because both alternatives actively control and treat contaminated groundwater. While the treatment technologies for Alternative 2 and Alternative 3 are the same (air stripping), Alternative 3 provides for modifications to the existing containment/extraction/treatment system. However, the modification of the containment/extraction/treatment system does not necessarily provide a greater ability to manage the migration of groundwater. Also, increased pumping or activation of additional extraction wells could mobilize subsurface DNAPLs that are located along the western boundary and potentially increase concentrations below the residences. Thus, Alternative 3 could have an adverse impact on overall protection of human health. The institutional controls included in Alternative 2 and Alternative 3 are the same and will be used to

restrict exposure to contaminated groundwater. Alternatives 2 and 3 include groundwater monitoring that could provide additional protection by timely identification of changing conditions in the aquifers. Additional protection would be accomplished by the limited amount of source reduction accomplished by periodic removal of PCB-contaminated oil from the 86-Inch CHT Line pits and the 144-Inch Finish Line electrical basement.

Because the No Action alternative for the Alcoa site is not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

Compliance with ARARs

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address hazardous substances, the remedial action to be implemented at the site, the location of the site, or other circumstances present at the site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law which, while not applicable to the hazardous materials found at the site, the remedial action itself, the site location, or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the site.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes or provides a basis for invoking a waiver.

Alternative 2 and Alternative 3 would comply with all location-specific and action-specific ARARs. However, based on the inability to restore NAPL-impacted groundwater in a reasonable timeframe, a TI waiver for chemical-specific ARARs is a necessary component of Alternative 2 and Alternative 3. Alternatives 2 and 3 would not be expected to attain ARARs within the TI zone but are expected to meet ARARs in areas beyond the TI zone. Groundwater monitoring will confirm if chemical-specific ARARs are being met in areas outside of the TI zone and in particular in the vicinity of South Bellingham Street and along the eastern boundary of the Alcoa facility.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean up levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of controls.

Alternative 2 would effectively restrict exposure to contaminated groundwater in offsite areas for as long as the PW-06 extraction well is in operation. Due to the type of contaminants and the geologic setting, it is not possible to provide a meaningful aquifer restoration timeframe, although in excess of 100 years is likely. The modified containment/extraction system in Alternative 3 would not necessarily provide better containment than the existing groundwater containment/extraction/treatment system and therefore a similar level of long-term effectiveness and permanence is expected. Also, increased pumping or activation of additional extraction wells could mobilize subsurface DNAPLs that are located along the western boundary and potentially increase concentrations below the residences. Thus, Alternative 3 could have an adverse impact on long-term effectiveness. The groundwater monitoring required by both alternatives will be effective under the LTMP for groundwater. Alternatives 2 and 3 also include institutional controls that will provide long-term effectiveness in restricting access to contaminated groundwater as long as the controls are enforced/maintained.

Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

The groundwater containment/extraction/treatment system in Alternative 2 provides effective containment within the T1 Zone that reduces the mobility of contaminated groundwater to offsite areas. Alternative 2 and Alternative 3 provide for treatment of the water by the air stripper that will reduce the toxicity and volume of contaminants. The modified containment/extraction/treatment system in Alternative 3 may not necessarily improve containment, but it may result in an increase in the volume of water being treated, and therefore an accompanying reduction of toxicity and volume of contaminants within the aquifer. However, increased pumping or activation of additional extraction wells could mobilize subsurface DNAPLs that are located along the western boundary and potentially increase concentrations below the residences. Thus, Alternative 3 could have an adverse impact by mobilizing DNAPL sources. Periodic removal of PCB-contaminated oil from the 86-inch CHT Line pits and the 144-inch Finish Line electrical basement would reduce the volume of contaminants in the subsurface. Under the groundwater monitoring component of Alternative 2 and Alternative 3, the LTMP will provide information on the quality and volume of groundwater that is extracted and treated.

Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the environment, and the community during construction and operation of the remedy until clean-up goals are achieved.

In general, the alternative with the fewest construction activities will pose the lowest risk to workers and the community during the remedial action. Installation of additional monitoring wells as part of the LTMP would be the only potential action associated with Alternative 2. Therefore, effects on human health and the environment during remedy implementation are

minimal. Additional monitoring wells may also be necessary for Alternative 3. Modifications to the containment/extraction system under Alternative 3 may include upgrading/adding extraction well(s) and installing associated piping to the air stripper. The effects of the upgrading/adding extraction wells to human health and the environment are expected to be minimal. However, increased pumping or activation of additional extraction wells could mobilize subsurface DNAPLs that are located along the western boundary and potentially increase concentrations below the residences. Thus, Alternative 3 could have an adverse impact on short-term effectiveness. Workers or the community could be exposed to contaminants in vapor emitted from the air stripper, however, the location of the air stripper minimizes any potential risk. The relatively minor amount of emissions associated with the air stripper are regulated by the state of Iowa as part of the overall air emissions from the Alcoa facility.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternative 2 is readily implementable as it is operation of the containment/extraction/treatment system as well as routine monitoring. Alternative 3 would involve the greatest level of effort in terms of remedy implementation. However, the labor and materials to implement the major elements of Alternative 3 are readily available and standard in the industry. Alternative 2 and Alternative 3 may also require additional monitoring wells to supplement the existing groundwater monitoring network that can be readily installed and maintained. The administrative procedures for implementing the institutional controls for Alternatives 2 and 3 are well known. Periodic removal of PCB-contaminated oil from the 86-Inch CHT Line pits and the 144-Inch Finish Line electrical basement requires minimal effort.

Cost

Cost includes estimated capital and operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

The estimated costs associated with each alternative was given with the description of the alternative. Alternative 2 would range between \$2.3 million and \$2.7 million, depending on whether the treated groundwater is discharged to the Mississippi River or used/recycled. Alternative 3 would range between \$2.6 million and \$3.0 million. For both Alternative 2 and Alternative 3, these costs include O&M for a period of 30 years. For Alternative 2 and Alternative 3 the containment, extraction, and treatment system would need to operate significantly longer than 30 years. Minimal costs are associated with the periodic removal of PCB-contaminated oil from the 86-Inch CHT Line pits and the 144-Inch Finish Line electrical basement. As with Alternative 2, there are substantial O&M costs associated with plant security, particularly the guards. However, the site security costs included in Alcoa's Groundwater FS

Report are not included in the above estimate because the level of security at the Alcoa facility is required regardless of the environmental issues.

The major difference in costs between Alternatives 2 and 3 reflects testing and containment/ extraction system upgrades, both of which are associated with Alternative 3.

State/Support Agency Acceptance

This criterion considers whether the state agrees with the EPA's analyses and recommendations of the RI/FS and the Proposed Plan.

The IDNR has expressed its support for the remedy selected by the EPA for the Alcoa site.

Community Acceptance

This criterion considers whether the local community agrees with the EPA's analyses and preferred alternative. Comments received on the Proposed Plan are important indicators of community acceptance.

During the Proposed Plan comment period, no written comments were received that opposed EPA's choice of Alternative 2 for the Alcoa site. There was one written comment that was received from the City of Davenport Public Works Department requesting clarification regarding discharge of the treated water from the stripping tower. Questions raised during the public meeting did not oppose EPA's choice of Alternative 2 for the Alcoa site, however, there were questions and comments that required a review of site files to compile pertinent information. Written comments and verbal comments received during the comment period, and EPA's responses, may be found in the Responsiveness Summary section of this ROD.

MRP15 Site

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through institutional controls, engineering controls, and/or treatment.

Alternative 1, the No Action alternative, may not adequately protect human health and the environment from the contaminants in fish and sediments. In addition, the No Action alternative would not meet the RAOs for the MRP15 site. The No Action alternative assumes that the current management of on-site media at the Alcoa site (i.e., existing groundwater containment/ extraction/treatment system and other activities described in Alternative 2 for the Alcoa site) would be discontinued and sediment and fish monitoring would not be implemented.

Discontinuing the management of on-site media could potentially lead to contaminant releases, including PCBs, into MRP15. This could potentially lead to increased concentrations in fish and sediments, thereby increasing human health and ecological risks.

Alternatives 2 and 3 would be protective of human health and the environment because management of on-site media at the Alcoa facility has effectively removed contaminant loads to MRP15, allowing conditions in the river to recover through natural processes. Sediment and fish tissue analyses conducted over time suggest there is a reasonable likelihood that the declining trends in exposure concentrations and associated risks will continue. Successful implementation of Alternatives 2 and 3 for the MRP15 site are dependent on continued management of on-site media at the Alcoa facility and, therefore, assumes that Alternative 2 or Alternative 3 for the Alcoa site would also be implemented. Alternative 2 for the MRP15 site would not meet the RAOs for the MRP15 site because without a monitoring component it is not possible to evaluate whether PCB concentrations in fish tissue are at levels protective of human health and the environment or if natural recovery processes are occurring and providing protection to human health and the environment.

Alternative 3 would provide monitoring to allow for ongoing evaluation of PCB concentrations in fish. Monitoring data would also be used to evaluate progress of natural recovery processes. MNR activities could provide additional protection by timely identification of changing conditions in MRP15. Alternative 3 would satisfy the RAOs for the MRP15 site.

Because the No Action alternative for the MRP15 site is not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

Compliance with ARARs

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address hazardous substances, the remedial action to be implemented at the site, the location of the site, or other circumstances present at the site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law which, while not applicable to the hazardous materials found at the site, the remedial action itself, the site location, or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the site.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes or provides a basis for invoking a waiver.

Alternative 2 and Alternative 3 would comply with ARARs. Chemical-specific ARARs (i.e., water quality criteria) are currently being met and are expected to be met in the future as long as on-site media are being actively managed in a manner that is protective of human health and the environment. Since there is no active remediation in MRP15 associated with Alternative 2 or Alternative 3, action-specific or location-specific ARARs do not apply.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean up levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of controls.

Alternatives 2 and 3 would maintain protection of human health and the environment over time. Alternatives 2 and 3 would provide long-term effectiveness because management of on-site media at the Alcoa facility has effectively removed contaminant loads to MRP15, allowing conditions in the river to recover through natural processes. Sediment and fish tissue analyses conducted over time suggest there is a reasonable likelihood that the declining trends in exposure concentrations and associated risks will continue.

Successful implementation of Alternatives 2 and 3 for the MRP15 site is dependent on continued management of on-site media at the Alcoa facility and, therefore, assumes that Alternative 2 or Alternative 3 for the Alcoa site would also be implemented. The declining trends in fish tissue concentrations have followed on-site source removal actions and in-river recovery processes. To the extent that these type of systems remain effective, Alternatives 2 and 3 will provide long-term protectiveness and permanence. The MNR component of Alternative 3 will provide data to evaluate protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative 2 and 3 do not include treatment of sediments as a component of the remedies and thus would not reduce toxicity, mobility, or volume of contaminants through treatment.

Successful implementation of Alternatives 2 and 3 for the MRP15 site is dependent on continued management of on-site media at the Alcoa facility and, therefore, assumes that Alternative 2 or Alternative 3 for the Alcoa site would also be implemented. There has been a reduction of toxicity, mobility and volume of contaminants to MRP15 as a result of management of on-site media at the Alcoa facility. Past on-site response actions have already reduced the available volume of such media through cleaning of on-site sewer discharge pipes, excavation of drainage channels, and management of plant processes that could contribute PCBs to the environment. Also, previous and ongoing containment, collection and treatment of groundwater has actively reduced the potential mobility of PCBs and other contaminants to MRP15.

Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the environment, and the community during construction and operation of the remedy until clean up goals are achieved.

Alternatives 2 and 3 do not require active remediation of the sediments in MRP15 and therefore short-term effectiveness is not a consideration. Alternative 3 would require monitoring and workers will be subject to the requirements of health and safety plans.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternatives 2 and 3 do not require active remediation of sediments in MRP15, and therefore implementability is not an issue. The MNR component of Alternative 3 can be easily implemented because activities such as monitoring can easily be performed, and have in fact been performed on numerous occasions since 1988.

Cost

Cost includes estimated capital and operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

Since there is no active remediation or monitoring associated with this Alternative 2, there are also no costs. Alternative 3 has costs for data collection and reporting associated with MNR activities. For costing purposes it was assumed that a minimum of three fish tissue and sediment monitoring events will be necessary at \$120,000 per event. The number fish tissue and sediment monitoring events that will be required is not known at this time.

State/Support Agency Acceptance

This criterion considers whether the state agrees with the EPA's analyses and recommendations of the RI/FS and the Proposed Plan.

The IDNR has expressed its support for the remedy selected by the EPA for the MRP15 site.

Community Acceptance

This criterion considers whether the local community agrees with the EPA's analyses and preferred alternative. Comments received on the Proposed Plan are important indicators of community acceptance.

During the Proposed Plan comment period, no written comments were received that opposed EPA's choice of Alternative 3 for the MRP15 site. The questions raised during the public meeting did not oppose EPA's choice of Alternative 3 for the MRP15 site. The comments and EPA's responses may be found in the Responsiveness Summary section of the ROD.

2.11 Principal Threat Wastes

Alcoa Site

The NCP establishes an expectation that the EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur.

NAPL sources (both LNAPL and DNAPL) in onsite groundwater are considered to be principal threat wastes. The LNAPL sources consist primarily of PCB-contaminated oils in onsite groundwater from samples collected in the southwest portion of the facility, near the EHDS and the Former Waste Disposal Site (i.e., the former waste oil lagoon). DNAPL sources are primarily associated with high concentrations of PCE and PAHs in onsite groundwater from samples collected in the northwest portion of the facility, near the PCE Aboveground Storage Tanks, and in the southwest portion of the facility near the EHDS and the Western Disposal Site.

NAPLs do not readily mix with water, though lesser amounts of both can go into solution or solubilize in water. Largely though, subsurface NAPLs and water share pore space in soils and rock. This "sharing of pore space" limits the mobility of NAPLs and complicates their recovery. At the Alcoa site, remediating DNAPL sources in fractured bedrock is not feasible due to the inability to locate and hydraulically contact DNAPL for removal or treatment which results from: 1) the poor connectivity of fractures, 2) the potential for DNAPL to be trapped in dead-end fractures, and 3) the significant depths (possibly 150 to 400 feet bgs) that DNAPL has migrated in the fractured limestone bedrock.

When there are conditions that may inhibit groundwater restoration, the EPA has established guidance and a mechanism to evaluate the technical impracticability of restoring groundwater to meet ARARs (e.g. MCLs). Alcoa prepared a Technical Impracticability (TI) Evaluation Report as part of the Groundwater FS Report for the Alcoa site to evaluate in-situ treatment technologies. The EPA has determined that restoration of groundwater within a reasonable timeframe is not practical based on hydrogeologic and contaminant-related factors, specifically the presence of NAPL sources in a fractured bedrock aquifer. Therefore, a TI waiver

is appropriate. The spatial extent (i.e., TI zone) over which the TI waiver would apply will be in an area that lies within the Alcoa property.

MRP15 Site

There are no principal threat wastes at the MRP15 site. The sediment concentrations along the Alcoa shoreline do not present an unacceptable risk to human health for the exposure scenarios evaluated. Also, no active remedial needs were identified for MRP15 based on the ecological risk assessment results. PCB and PAH concentrations are elevated in localized areas along the Alcoa shoreline, but the ecological significance appears to be minimal based on the small size of the area and anticipated further reductions in contaminant concentrations. The mobility and the bioavailability of the low level contamination in the sediments are reduced as a result of sedimentation processes that are occurring along the Alcoa shoreline.

2.12 Selected Remedy

Alcoa Site

The selected remedy for the Alcoa site is Alternative 2 - Groundwater Containment, which includes Groundwater Extraction and Treatment, Source Area Remediation, Groundwater Monitoring, and Institutional Controls. The selected remedy will address groundwater at the Alcoa site. Soils and other media associated with the FSA units located on the Alcoa site have been addressed under removal authority.

Summary of the Rationale for the Selected Remedy

The main factors influencing EPA in its selection of the remedy for the Alcoa site include the following.

- Based on the inability to restore contaminated groundwater in a reasonable timeframe, EPA determined that a Technical Impracticability (TI) waiver for chemical-specific ARARs is a necessary component of the selected remedy.
- Groundwater containment provided by PW-06 will prevent migration of contaminated groundwater from the TI zone to areas outside the TI zone and therefore prevent contaminant migration to offsite areas.
- Monitoring of groundwater at the Alcoa site will continue to ensure compliance with MCLs in areas outside the TI zone.
- Groundwater not being used as a domestic source of water as local residences and businesses are connected to city water supply.
- Institutional controls will be used to further control exposure to groundwater in offsite areas and onsite areas.

- The improved environmental conditions at the Alcoa facility that are attributable to better management of on-site media and chemicals used at the Alcoa facility.

Description of Selected Remedy

The selected remedy for the Alcoa site consists of groundwater containment, which includes groundwater extraction and treatment, source area remediation, groundwater monitoring, and institutional controls. Operation of a groundwater containment/extraction/treatment system will provide containment of the groundwater contamination. As stated previously, additional evaluation of the vapor intrusion pathway will be conducted, and if necessary, appropriate response measures will be implemented. A contingency plan will also be necessary in the event groundwater concentrations exceed ARARs in areas beyond the TI zone. This alternative is believed to provide the best balance of trade-offs among the three Alcoa alternatives with respect to the evaluation criteria.

The selected remedy for the Alcoa site takes into consideration the improved environmental conditions at the Alcoa facility that are attributable to previous and ongoing cleanup activities and plant improvement/maintenance projects. The first component of the selected remedy for the Alcoa Site involves the operation of a groundwater containment/extraction/treatment system. This will serve to contain contaminated groundwater within the boundaries of the Alcoa facility, thus preventing potential exposure to groundwater in offsite areas. There is currently no ingestion of contaminated groundwater in offsite areas because residences along South Bellingham Street and neighboring businesses are connected to the city water supply. The primary purpose of the groundwater containment/extraction system is containment, however, the associated treatment system will also lead to groundwater source reduction. The second component of the selected remedy for the Alcoa Site involves source area remediation. This refers to the active collection and disposal of subsurface NAPL from areas within the Alcoa facility wherever technically feasible. Monitoring of groundwater at the Alcoa site will also be implemented to ensure compliance with MCLs in areas outside the TI zone. A LTMP will be developed during the Remedial Design to provide for the collection of water level data and groundwater samples for subsequent laboratory analyses. The selected remedy for the Alcoa site also involves implementing the various institutional controls (i.e., layering of institutional controls) that are available to restrict potential future exposure to contaminated groundwater. Layering of institutional controls is an effective approach and the specific institutional controls for the Alcoa Site would include the following existing and additional controls.

- Iowa State Plumbing Code, 641.25.6, has restrictions on cross-connecting a residential groundwater supply and a city water supply. Residences along South Bellingham Street and neighboring businesses are connected to the city water supply and therefore existing or future drinking water wells cannot be connected to the city water supply.

- Local zoning ordinances are in place through the town of Riverdale. The Alcoa-Davenport property and property to the northeast is zoned for heavy industry. The current residential area along South Bellingham Street is zoned commercial/light industry.
- An existing Declaration of Restrictive Covenants filed with the Scott County Recorder's office that prohibits construction of drinking water wells within the entire fenced boundary of the Alcoa facility as part of an underground storage tank closure with IDNR. Additionally, Alcoa will execute and record against the Alcoa property an Environmental Protection Easement and Declaration of Restrictive Covenants enforceable by the state of Iowa with the EPA as a third party beneficiary so that EPA could also enforce the restrictions. The Environmental Protection Easement will include requirements that will prohibit the installation of drinking water wells at the Alcoa facility.
- Continued listing of the Site on the Registry of Hazardous Waste or Hazardous Substance Disposal Sites pursuant to Iowa Administrative Code 455B.426. The Iowa Administrative Code 148.6(5) requires written approval of the Director of the IDNR prior to any substantial change in the use of the listed site. In addition, written approval is also required to sell, convey, or transfer title of the listed site.

Since the remedy leaves contaminants in place, five-year reviews will be conducted as required by CERCLA until such time that uncontrolled exposure to contaminant levels in groundwater and soil do not pose an unacceptable risk to human health and the environment. The five-year review process will be used to identify any opportunity to improve the performance and/or reduce the cost of sampling and monitoring activities and operating treatment systems. The five-year review will also provide an opportunity to identify new or improved technologies that could substantially decrease the groundwater restoration time frame, and thus, decrease costs associated with the groundwater component of the remedial alternative.

Based on the information available at this time, the EPA believes that the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the selected remedy to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs (or justify a waiver); 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element.

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Summary of the Estimated Remedy Costs

The estimated cost of the selected remedy is between \$2.3 million and \$2.7 million. These costs assume operation and maintenance (O&M) costs over a period of 30 years. The EPA has determined that it is difficult to accurately project O&M costs beyond 30 years. Since it is anticipated that O&M will exceed this 30-year period, the costs may be significantly more than the estimated costs. There are also substantial O&M costs associated with plant security, particularly the guards. However, the site security costs included in Alcoa's Groundwater FS Report are not included in the above estimate because security at the Alcoa facility is required regardless of the environmental issues. Table 4-4 from the May 2004 Groundwater FS Report, which is attached, provides a detailed cost estimate and assumptions for implementation of the selected remedy for the Alcoa site.

Expected Outcomes of the Selected Remedy

The expected outcome of the selected remedy for the Alcoa site is that there will not be any ingestion of contaminated groundwater in areas outside the TI zone or in areas within the TI zone. Groundwater containment provided by PW-06 will prevent migration of contaminated groundwater from the TI zone to areas outside the TI zone and therefore prevent contaminant migration to offsite areas. In addition, groundwater extraction and treatment will reduce contaminant concentrations. The limited on-going source area remediation that consists of the periodic removal of PCB-contaminated oil from the 86-Inch CHT Line pits and the 144-Inch Finish Line electrical basement will not have an appreciable effect on reducing groundwater contaminant concentrations but will result in less contaminant loading to the subsurface. The groundwater monitoring component will provide the necessary information to assure the groundwater containment system is effectively controlling groundwater migration. Groundwater monitoring will also be used to assess the quality of the groundwater in areas outside and inside the TI zone and ensure compliance with MCLs in areas outside the TI zone. Restoration of the aquifer within the TI zone to drinking water standards in less than 100 years is unlikely. Institutional controls will be used to control exposure to groundwater in offsite areas and onsite areas.

MRP15 Site

The selected remedy for the MRP15 site is Alternative 3 - Monitored Natural Recovery with Management of On-site Media at the Alcoa-Davenport Works. The selected remedy addresses contaminated sediments and fish in MRP15 adjacent to the Alcoa facility and provides for MNR, but active remediation of sediments would not be required. MNR is a cleanup method that uses ongoing, naturally occurring, biological, chemical, or physical processes to contain, destroy, or otherwise reduce the bioavailability or toxicity of contaminants in sediments. For the MRP15 site, MNR would include the evaluation of sediment bed stability in the areas along the Alcoa shoreline and in the wetland area adjacent to the Alcoa shoreline between outfall 004 and outfall 005. MNR would also include collection of fish from locations along the Alcoa shoreline and, for comparison, from areas not impacted by Alcoa (i.e., reference areas). An MNR program will be developed during the subsequent Remedial Design to provide for the collection of

appropriate analytical data and information to monitor natural recovery processes along Alcoa's shoreline. Monitoring is performed as part of MNR to demonstrate that contaminant reduction is occurring, and that the reduction is achieving the RAOs.

Summary of the Rationale for the Selected Remedy

The main factors influencing EPA in its selection of an MNR approach as the remedy for the MRP15 site are include the following.

- Improved management of on-site media at the Alcoa facility has resulted in control of ongoing sources to MRP15.
- Contaminant concentrations in sediments along the Alcoa shoreline in MRP15 have decreased.
- Decrease in PCB levels in fish collected along the Alcoa shoreline in MRP15 to levels that are now similar to fish collected in reference areas in MRP15.
- Current PCB levels in fish are near risk-based cleanup goals.
- Natural recovery processes are ongoing and should continue.
- Sediment bed stability in areas along the Alcoa shoreline adjacent to MRP15 is evident.

Description of Selected Remedy

The selected remedy for the MRP15 site is monitored natural recovery with management of on-site media at the Alcoa-Davenport Works. This alternative is believed to provide the best balance of trade-offs among the three MRP15 alternatives with respect to the evaluation criteria.

An MNR program will be developed during the subsequent Remedial Design to provide for the collection of appropriate analytical data and information to monitor natural recovery processes along Alcoa's shoreline. MNR will provide information on fish tissue concentrations and sediment bed stability in the areas along the Alcoa shoreline to demonstrate that contaminant reduction is occurring, and that the reduction is achieving the RAOs.

The selected remedy for MRP15 takes into consideration the improved environmental conditions at the Alcoa facility that are attributable to on-site management of environmental media, including the continued operation of the groundwater containment, extraction and treatment system. Implementation of the selected remedy for MRP15 site is dependent on continued management of on-site media at the Alcoa facility and, therefore, assumes that Alternative 2 or Alternative 3 for the Alcoa site will also be implemented.

Since the remedy leaves contaminants in place, five-year reviews will be conducted as required by CERCLA until such time that uncontrolled exposure to contaminant levels in fish and sediment do not pose an unacceptable risk to human health and the environment. The five-year review process will be used to identify any opportunities to improve the performance and/or reduce the costs of sampling and monitoring activities.

Based on the information available at this time, the EPA believes that the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the selected remedy to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs (or justify a waiver); 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element.

Summary of the Estimated Remedy Costs

For costing purposes it was assumed that a minimum of three fish tissue and sediment monitoring events will be necessary at \$120,000 per event. The first event would take place following negotiation of the Consent Decree, and two follow-up events would take place in the fourth year of the five-year review periods. Therefore the estimated monitoring costs for these three events is \$360,000. There are also costs associated with the five-year reviews. These additional costs are associated with data collection, data management, and reporting and are estimated at \$50,000 per five-year review event. The number of monitoring events and five-year reviews that will be required is not known at this time.

Expected Outcomes of the Selected Remedy

The expected outcome of the selected remedy for the MRP15 site is that sediment concentrations and fish tissue concentrations will remain the same or decrease as natural recovery processes continue. Monitoring will provide the necessary information to determine if concentrations in sediment and fish are protective of human health and the environment.

2.13 Statutory Determinations

Under its legal authority, the EPA's primary responsibility at Superfund sites is to ensure that remedial actions achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for the Alcoa site and the selected remedial action for the MRP15 site must comply with applicable or relevant and appropriate requirements established under federal and state environmental laws, unless a statutory waiver is justified. The selected remedies also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that

employ treatment that permanently and significantly reduce the volume, toxicity, and mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedies meet these statutory requirements.

Protection of Human Health and the Environment

Alcoa Site

The selected remedy for the Alcoa site will protect human health and the environment by achieving the remedial action objectives established for the Alcoa site. The groundwater containment/extraction/treatment system at the Alcoa site will serve to contain contaminated groundwater within the boundaries of the Alcoa facility, thus preventing potential exposure to groundwater in offsite areas. There is currently no ingestion of contaminated groundwater in off-site areas because residences along South Bellingham Street and neighboring businesses are connected to the city water supply. Monitoring of groundwater at the Alcoa site will also be implemented to ensure compliance with MCLs in areas outside the TI zone. The selected remedy for the Alcoa site also involves implementing the various institutional controls (i.e., layering of institutional controls) that are available to restrict potential future exposure to contaminated groundwater.

MRP15 Site

The selected remedy for the MRP15 site will protect human health and the environment by achieving the remedial action objectives established for the MRP15 site. MNR is a cleanup method that uses ongoing, naturally occurring, biological, chemical, or physical processes to contain, destroy, or otherwise reduce the bioavailability or toxicity of contaminants in sediments. An MNR program will be developed during the subsequent Remedial Design to provide for the collection of appropriate analytical data and information to monitor natural recovery processes along Alcoa's shoreline. Monitoring is performed as part of MNR to demonstrate that contaminant reduction is occurring, and that the reduction is achieving the RAOs for fish and sediments.

Compliance With ARARs

Alcoa Site

The selected remedy for the Alcoa site is expected to comply with ARARs, except for chemical-specific ARARs that were waived as part of the TI ARAR Waiver process. Tables 3-1 through 3-4 from the May 2004 Alcoa Groundwater Feasibility Study Report, which are attached, list the ARARs for the Alcoa site. Wastewater discharge to the sanitary sewer can contain treated process water. Therefore, the Davenport Water Pollution Control Pretreatment Program is also an ARAR for the Alcoa site in the event that there is any discharge of treated groundwater to Alcoa's industrial sewer system as a result of recycling the treated groundwater through the plant for re-use.

MRP15 Site

The selected remedy for the MRP15 site is expected to comply with all ARARs. Table 3-3 through 3-5 from the May 21, 2004 MRP15 FS Report lists the ARARs for the MRP15 site.

Cost Effectiveness

Alcoa Site

The EPA believes the selected remedy for the Alcoa site is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the selected remedy was determined to be proportional to the cost and hence the selected remedy represents a reasonable value for the money to be spent.

MRP15 Site

The EPA believes the selected remedy for the MRP15 site is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the selected remedy was determined to be proportional to the cost and hence the selected remedy represents a reasonable value for the money to be spent.

Utilization of Permanent Solutions and Alternative Treatment Technology to the Maximum Extent Practicable

Alcoa Site

The selected remedy for the Alcoa site represents the maximum extent to which permanent solutions and treatment can be utilized in a cost-effective manner for the Alcoa site. The selected remedy for the Alcoa Site will effectively reduce VOC concentrations in groundwater but it is also

recognized that cleanup of groundwater located in certain portions of the aquifer is not practical. EPA has determined that restoration of groundwater is not practical based on hydrogeologic and contaminant-related factors, specifically the presence of NAPL sources in a fractured bedrock aquifer. Based on the inability to restore contaminated groundwater in a reasonable timeframe, a TI waiver for chemical-specific ARARs is a necessary component of the selected remedy.

The Groundwater FS and the TI Evaluation Report for the Alcoa site provide an evaluation of other technologies that were considered but screened out. The following alternative treatment technologies were evaluated for the Alcoa site: 1) In-Situ Chemical Oxidation; 2) In-Situ Chemical Reduction; 3) Bioremediation; 4) Air Sparging; 5) In Well Stripping; and 6) Permeable Reactive Barriers.

MRP15 Site

The selected remedy for the MRP15 site represents the maximum extent to which permanent solutions and treatment can be utilized in a cost-effective manner for the MRP15 site. Active remediation of sediments will not be implemented, but MNR is a cleanup method that uses ongoing, naturally occurring, biological, chemical, or physical processes to contain, destroy, or otherwise reduce the bioavailability or toxicity of contaminants in sediments. For the MRP15 site, an MNR program will be developed during the subsequent Remedial Design to provide for the collection of appropriate analytical data and information to monitor natural recovery processes along Alcoa's shoreline.

The MRP15 Feasibility Study provides an evaluation of other technologies that were considered but screened out. The following active remediation alternative treatment technologies were evaluated for the MRP15 site: 1) In-Situ Capping; 2) Dredging; 3) In-Situ Treatment; and 4) Ex-Situ Treatment.

Five-Year Review Requirements

If there are hazardous substances, pollutants, or contaminants remaining at a site above levels that would allow for unlimited use and unrestricted exposure, pursuant to Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(C), the EPA shall conduct a review of such remedial action no less often than each five years after the initiation of the remedial action to assure that human health and the environment are being protected.

Alcoa Site

The Alcoa site will require a statutory five-year review.

MRP15 Site

The MRP15 site will require a statutory five-year review.

2.14 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

Alcoa Site

The Proposed Plan for the Alcoa site was released for public comment in July 2004. The Proposed Plan identified Alternative 2 for the Alcoa site as the preferred alternative. The EPA reviewed the comments received during the public comment period.

Alternative 2 for the Alcoa site includes discharge of treated water from the groundwater containment/extraction/treatment system (i.e., from the air stripper). As stated in the Proposed Plan, the treated groundwater would be either discharged using an existing NPDES permit or recycled for plant re-use. The recycle/reuse option was considered in the event that Alcoa had a future demand for industrial process water and as such the treated water from the air stripper would be introduced into Alcoa's industrial wastewater system. During public comment period, the City of Davenport Public Works Department requested clarification regarding the recycling of the treated groundwater through the plant for re-use. The letter from the City of Davenport Public Works Department states that, "Recent baseline monitoring of the wastewater discharge from the Alcoa facility and an internal investigation by Alcoa environmental staff indicates that some of the returned process water from their (Alcoa's) onsite process wastewater treatment system is utilized internally and discharged to the sanitary sewer. Therefore, their (Alcoa's) wastewater discharge to the sanitary sewer can contain treated process water." Since this treated water could inadvertently be discharged to the sanitary sewer, and sanitary sewer discharge from the Alcoa facility falls under the Davenport Water Pollution Control Pretreatment program, the City of Davenport Public Works Department further states that, "A complete approval process must be completed by my office (Davenport Water Pollution Control Pretreatment office) prior to any discharge of treated groundwater to the sanitary sewer collection system."

In summary, wastewater discharge to the sanitary sewer can contain treated process water. Therefore, the Davenport Water Pollution Control Pretreatment Program is also an ARAR for the Alcoa site in the event that there is any discharge of treated groundwater to Alcoa's industrial sewer system as a result of recycling the treated groundwater through the plant for re-use.

In addition, the existing NPDES permit contains an effluent limitation for only one of the groundwater COPCs, tetrachloroethylene at a maximum of .015 mg/l. After reviewing additional information regarding the existing NPDES permit, EPA has determined that in addition to analytical data provided by the current NPDES sampling, analytical data for other COPCs and COPECs is necessary to assess protectiveness of human health and the environment. Discharge limits for the COPCs and COPECs will need to be part of the NPDES permit. If no NPDES discharge limitation exists for a COPC or a COPEC, then the MCLs established under the Safe Drinking Water Act will be the discharge limit. The additional effluent parameters will be incorporated into the LTMP that will be developed during the Remedial Design.

In view of the above information, the description of the discharge of the treated groundwater has been changed to read that it will be either discharged to the Mississippi River at levels protective of human health and the environment or recycled for plant re-use under the guidelines of the Davenport Water Pollution Control Pretreatment program. Also, the Davenport Water Pollution Control Pretreatment Program is an ARAR for the Alcoa site in the event that there is any discharge of treated groundwater to Alcoa's industrial sewer system as a result of recycling the treated groundwater through the plant for re-use. Increased costs may be associated with changes to the treatment and discharge of the effluent from the groundwater containment/extraction/treatment system.

MRP15 Site

The Proposed Plan for the MRP15 site was released for public comment in July 2004. The Proposed Plan identified Alternative 3 for the MRP15 site as the preferred alternative. The EPA reviewed the comments received during the public comment period. It was determined that no significant changes to the remedy for the MRP15 site, as originally identified in the Proposed Plan, were necessary or appropriate.

RECORD OF DECISION

PART 3: RESPONSIVENESS SUMMARY

This Responsiveness Summary has been prepared in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan (NCP) 40 CFR §300.430(f). This document provides the United States Environmental Protection Agency's (EPA's) response to all significant comments received on the Proposed Plan for the Alcoa site and the MRP15 site from the public during the 30-day public comment period.

On July 28, 2004, the EPA released the Proposed Plan and Administrative Record files for the Alcoa site and the MRP15 site. The Administrative Record files for the Alcoa site and the MRP15 site contain site-related documents and are located at the Bettendorf Public Library and the EPA Region VII office. The Proposed Plan discussed the EPA's proposed actions to address contaminated groundwater at the Alcoa site and contaminated sediments and fish at the MRP15 site. The public comment period began on July 28, 2004 and ended on August 26, 2004. The EPA held a public meeting on August 19, 2004 at the Riverdale Town Hall to present the Proposed Plan and provide the public an opportunity to comment. A copy of the transcript from the public meeting is included in the Administrative Record file.

3.1 Stakeholder Issues and Lead Agency Responses

The following written comment was received during the comment period.

The City of Davenport Public Works Department requested clarification regarding the recycling of the treated groundwater through the plant (Alcoa facility) for re-use.

Alternative 2 for the Alcoa site includes discharge of treated water from the groundwater containment/extraction/treatment system (i.e., from the air stripper). As stated in the Proposed Plan, the treated groundwater would be either discharged using an existing NPDES permit or recycled for plant re-use. The recycle/reuse option was considered in the event that Alcoa had a future demand for industrial process water and as such the treated water from the air stripper would be introduced into Alcoa's industrial wastewater system. The City of Davenport Public Works Department submitted a written comment that requested clarification regarding the recycling of the treated groundwater through the plant for re-use.

The letter from the City of Davenport Public Works Department states that, "Recent baseline monitoring of the wastewater discharge from the Alcoa facility and an internal investigation by Alcoa environmental staff indicates that some of the returned process water from their (Alcoa's) onsite process wastewater treatment system is utilized internally and discharged to the sanitary sewer. Therefore, their (Alcoa's) wastewater discharge to the sanitary sewer can

contain treated process water." Since this treated water could inadvertently be discharged to the sanitary sewer, and sanitary sewer discharge from the Alcoa facility falls under the Davenport Water Pollution Control Pretreatment program, the City of Davenport Public Works Department further states that, "A complete approval process must be completed by my office (Davenport Water Pollution Control Pretreatment office) prior to any discharge of treated ground water to the sanitary sewer collection system."

In summary, the Davenport Water Pollution Control Pretreatment Program has determined that wastewater discharge to the sanitary sewer can contain treated process water. Therefore, the Davenport Water Pollution Control Pretreatment Program is also an ARAR for the Alcoa site in the event that there is any discharge of treated groundwater to Alcoa's industrial sewer system as a result of recycling the treated groundwater through the plant for re-use.

In view of the above information, the description of the discharge of the treated groundwater has been changed to read that it will be either discharged to the Mississippi River at levels protective of human health and the environment or recycled for plant re-use under the guidelines of the Davenport Water Pollution Control Pretreatment program.

The following verbal comments were received during the August 19, 2004 public meeting.

A community member asked if the comment period is normally about a month long.

Yes, the length of the comment period for a Proposed Plan is typically 30 days.

A community member asked what the PCB levels in groundwater and fish were initially and what they are today.

Groundwater: The principal water-bearing zones beneath the Alcoa site are found in the shallow, intermediate, and deep bedrock formations. Annual groundwater reports indicate that bedrock monitoring wells were initially sampled for PCBs in the mid to late 1980's. With the exception of the shallow bedrock well DS, located to the north of the Former Waste Disposal Site (FWDS), no other bedrock monitoring well has had detectable concentrations of PCBs. Monitoring well DS has had a concentration of 2.8 parts per billion (ppb) in October 1988, 2 ppb in October 1991, 0.6 ppb in October 1993, 0.8 ppb in May 1994. PCB-analysis in bedrock monitoring wells continued through 1997 at which time it was decided that PCBs were not a contaminant of potential concern in bedrock groundwater. There is also a surficial water-bearing zone present in some of the unconsolidated deposits within the Alcoa site. Monitoring in the early 1980's of the shallow unconsolidated zone wells immediately adjacent to the FWDS indicated a separate phase, PCB-containing oil layer was on top of the groundwater. However, collecting a representative unconsolidated zone groundwater sample in the vicinity of the FWDS, and therefore an accurate measurement of PCB concentrations, was not possible.

The annual groundwater monitoring reports, the quarterly groundwater monitoring reports, and other groundwater information is in the Administrative Record file for the Alcoa site.

Fish: The biennial fish sampling program was conducted from 1988 to 1998. Fish were primarily collected from three sites on the Iowa side of the Mississippi River and from one site on the Illinois side. Common carp, river carpsucker, and channel catfish were the species most consistently collected. The May 2000 Evaluation of Biennial Fish Investigations report and the Assessment of PCB Concentrations in Fish reports for the specific years (i.e., 1988, 1990, 1992, 1994, 1996, and 1998) provide detailed information regarding the fish sampling program and discussion of analytical results.

In the May 2000 Evaluation of Biennial Fish Investigations report, the data from the three sites on the Iowa side (i.e., two sites were adjacent to the Alcoa shoreline and the other site was just downstream near the mouth of Duck Creek) were combined for each species for subsequent evaluation. In 1988, the 95% upper confidence limit (UCL) value of PCBs in fish tissue samples from all three sites was 4.7 ppm for common carp, 25.9 ppm for river carpsucker, and 1.8 ppm for channel catfish. In 1998, the 95% upper confidence limit (UCL) value of PCBs in fish tissue samples from all three sites was 0.44 ppm for common carp and 0.42 ppm for river carpsucker. In 1996, the last year that channel catfish were collected, the 95% upper confidence limit (UCL) value of PCBs in fish tissue samples was 0.40 ppm for channel catfish. The data from the biennial fish investigations clearly show a decreasing trend for PCBs in fish tissue.

The May 2000 Evaluation of Biennial Fish Investigations report and the Assessment of PCB Concentrations in Fish reports for the specific years (i.e., 1988, 1990, 1992, 1994, 1996, and 1998) are in the Administrative Record file for the MRP15 site.

A community member asked if there was a home (along S. Bellingham) that draws well water.

No, all houses along S. Bellingham are connected to the city water supply. The domestic water supply wells for all of the houses along S. Bellingham have been decommissioned or the pumps are inoperable. The final house that was relying on a water well for its domestic water supply was connected to the city water supply in March 1999.

A community member asked why it is important if there are residential wells since it was stated that contamination is within the boundaries of Alcoa's fences.

Elevated concentrations of PCE, TCE, and DCE have been observed in the monitoring wells located in the northwest portion of the Alcoa facility since being installed in 1990. The analytical results from the off-site monitoring wells (i.e., L-wells) and the groundwater elevation measurements indicate that the pumping of a process well (i.e., PW-06) on the Alcoa property is serving to draw groundwater and related contamination toward PW-06 and away from S.

Bellingham Street. However, it is prudent to not have an active residential well drawing groundwater for household purposes from an area that is close to groundwater that has elevated concentrations of PCE, TCE, and DCE as observed in monitoring wells (i.e., H-wells) located just inside the Alcoa fence line. Pumping of private wells is not necessary given that the houses in the S. Bellingham area are serviced by the local water supply.

A community member expressed concern about possible past exposure to contaminated drinking water.

In 2001, the Iowa Department of Public Health (IDPH) was asked by EPA to determine the public health significance of groundwater contamination in the area near S. Bellingham Street. The October 25, 2001 Health Consultation prepared by IDPH concluded that the Alcoa site did not pose a public health hazard and that exposure to groundwater did not exist because residents were utilizing the local municipal water supply. The Health Consultation also concluded that completed past exposure to groundwater could have existed for the S. Bellingham residents, but data on groundwater concentrations of PCE or TCE prior to 1993 are unavailable to confirm this. However, available monitoring well data and exposure estimates indicated that any past exposure to PCE or TCE would likely not have been at levels of health concern.

The October 25, 2001 Health Consultation was provided to each household on S. Bellingham Street in December 2001. The October 25, 2001 Health Consultation is in the Administrative Record file for the Alcoa site.

A community member asked if any wells outside of Alcoa's boundaries have ever exceeded allowable levels of any dangerous chemicals.

Between October 1992 to October 1994, groundwater samples collected from an off-site monitoring well (L-well) located on the vacant lot at 232 S. Bellingham Street had levels of trichloroethylene (TCE) that ranged from 6 parts per billion (ppb) to 10 ppb. The Maximum Contaminant Levels (MCL) established under the Safe Drinking Water Act for TCE are standards that apply to public water supply systems and the MCL for TCE is 5 ppb. Groundwater samples collected from the L-wells, which are located in shallow and intermediate bedrock formations, have been non-detect or at levels below the MCLs since February 1995 for all of the volatile organic compounds (VOCs) analyzed for, including TCE and perchlorethylene (PCE) and their breakdown products of DCE and vinyl chloride. TCE and PCE have been or are currently used as degreasing agents to clean sheets of aluminum at the Alcoa facility.

In response to TCE being detected in the L-well in late 1992, sampling of the only drinking water well that was still in service on S. Bellingham Street was initiated in early 1993. Samples were collected from 1993 to 1999 and drinking water standards were never exceeded for any of the VOCs, including TCE. Nearly all of the samples were at non-detectable levels for all VOCs. The well was closed in March 1999. In response to TCE being detected in the L-well, two wells that were not being used for drinking water purposes were also sampled on S.

Bellingham Street in 1993. These wells were non-detect for all VOCs.

An off-site monitoring well (WA-01D) located to the southwest of S. Bellingham Street was sampled in 1998 and the results were non-detect. The well at Alcoa's Kelly Cottage near the Mississippi River, also located to southwest of S. Bellingham Street, was sampled in 1989 and 1998 and the results were non-detect for VOCs and PCBs. The well at Alcoa's Crissey House, located north of the Alcoa facility across Highway 67, has also been sampled and the results were non-detect for VOCs and PCBs. In November 1983, drinking water wells were sampled at two houses on S. Bellingham Street and three houses located in the neighborhood to the west (i.e., farther away from Alcoa). There were no detectable concentrations of contaminants of concern, including PCBs, in any of the November 1983 samples.

The annual groundwater monitoring reports, the quarterly groundwater monitoring reports, and other groundwater information is in the Administrative Record file for the Alcoa site.

A community member asked if a resident on S. Bellingham could assume that their properties are not on contaminated soils or contaminated groundwater and thus not affect the property values.

Quarterly groundwater samples collected from the off-site monitoring well (i.e., L-wells) that is located in the vacant lot at 232 S. Bellingham have been non-detect or at levels below the MCLs since February 1995 for all of the volatile organic compounds (VOCs) analyzed for, including TCE and perchlorethylene (PCE) and their breakdown products of DCE and vinyl chloride. From 1993 to 1999, groundwater samples were also collected from a domestic well at a house on S. Bellingham Street. Concentrations of VOCs never exceeded drinking water standards and nearly all of the samples were at non-detectable levels for all VOCs.

A soil sample was collected in 1993 from a garden area at a house on S. Bellingham Street and analyzed for VOCs. VOCs were not detected in the soil sample from the garden area. This is the only analytical result that is available from residential soil in the area along S. Bellingham Street.

The EPA is not in a position to address issues regarding property values.

A community member asked if soils on Alcoa property near S. Bellingham had been sampled and, if so, what were the results. Another community member commented that when flooding occurred the creek (now referred to as outfall 001) that ran along S. Bellingham would overflow and that water would flow into the streets and other areas and asked how long would that contamination stay in the ground.

Soils on Alcoa property near S. Bellingham Street have been during the installation of a water main (1991) and to support environmental investigations in the northwest portion of the Alcoa facility (early 1990s). The Alcoa property that is closest to S. Bellingham Street is the

small strip of land located between outfall 001 and Alcoa's western fenceline. Two soil samples within this strip of land were collected at a depth of 8 feet during the installation of the water main. The samples were analyzed for a group of chemicals referred to as volatile organic compounds (VOCs), including PCE and TCE. VOCs were not detected in these two samples. Four soil samples were collected within this strip of land to support the evaluation of the PCE tanks. These samples were collected at depths ranging from 4.5 feet to 11.5 feet and were analyzed for VOCs. PCE was detected in one of the four samples at 31 parts per billion which is a level that does not present an unacceptable risk. No other VOCs were detected in the soil samples from the described strip of land.

The chlorinated solvents, PCE and TCE, are classified as volatile organic compounds (VOCs) and are the primary contaminants of concern in the northwest portion of the Alcoa facility. Typically, VOCs are not present at elevated concentrations in surface soils due to their physical and chemical characteristics (i.e., volatile nature). A soil sample was collected in 1993 from a garden area at a house on S. Bellingham Street and analyzed for VOCs. VOCs were not detected in the soil sample from the garden area. This is the only analytical result that is available from residential soil in the area along S. Bellingham Street.

The evaluations of the Facility Site Assessment (FSA) units in the northwest area of the Alcoa facility, including outfall 001 and the PCE tank area are included in the Risk-Based Concentration (RBC) Reports for these FSA units. More detailed information, including the RBC Reports, is in the Administrative Record file for the Alcoa site.

A community member asked when information from the vapor investigation at the Alcoa-owned houses on S. Bellingham would be available and why those houses were sampled.

The information from the vapor intrusion investigation at the Alcoa-owned houses is available and has been shared with the residents along S. Bellingham Street. Detectable concentrations of certain volatile organic compounds (VOCs) were found below the houses during the sub-slab gas investigation. EPA and Alcoa are working together to address the concerns of community members and determine the appropriate next steps. These next steps will include further sampling and possible installation of ventilation systems in houses. The Alcoa-owned houses were sampled first because Alcoa was conducting the sampling effort and had easy access to those houses.

Two community members commented that they use to fish and play in and around the water filled quarry at the top of creek (i.e., outfall 001) and they observed dead ducks and oil in the water.

The exact period of time that the above comment is referring to not known, however it appears that it could be during the 1960s and 1970s. The EPA does not have knowledge of the conditions during that timeframe, but recent evaluations indicate that conditions have changed as

a result of improved waste management and production practices at the Alcoa facility.

The September 2001 Ecological Risk Characterization for the Facility Site Assessment Units evaluated the potential for ecological risks in conjunction with various areas on the Alcoa facility, including outfall 001 and the quarry pond. The raccoon, the little brown bat, and the mallard duck were identified and evaluated as potential ecological receptors. It was concluded that exposure to sediment and water in the outfalls and the quarry pond does not present an unacceptable risk to these ecological receptors.

The September 2001 Ecological Risk Characterization for the Facility Site Assessment Units is in the Administrative Record file for the Alcoa site.

A community member asked how long PCE had been leaking from the PCE tank area and whether it could have been leaking when he played in that area.

In 1968, two above ground 10,000 gallon steel tanks were installed in the northwest area of the Alcoa facility to store degreasing solvent. Initially, trichloroethylene (TCE) was used in the cleaning process and was later replaced by perchloroethylene (PCE) in the mid-1970s. In late 1989, the area surrounding the PCE tanks was excavated to replace the earthen containment dike with an epoxy-coated concrete secondary containment structure. During the excavation activities PCE was discovered in subsurface soils, apparently the result of a leak in a pump packing located at the tanks. Approximately 300 cubic yards of material were removed from this area to address the PCE soil contamination. The exact times these tanks may have leaked is unknown.

Several community members had concerns regarding the possibility that residential soils along S. Bellingham Street could be contaminated.

Health risk is a function of exposure to the soil and the types and concentrations of the chemicals in the soil. The chlorinated solvents, PCE and TCE, are classified as volatile organic compounds (VOCs) and are the primary contaminants of concern in the northwest portion of the Alcoa facility. Typically, VOCs are not present at elevated concentrations in surface soils due to their physical and chemical characteristics (i.e., volatile nature). A soil sample was collected in 1993 from a garden area at a house on S. Bellingham Street and analyzed for VOCs. VOCs were not detected in the soil sample from the garden area. This is the only analytical result that is available from residential soil in the area along S. Bellingham Street.

The following comment was received during a phone conversation.

A community member asked if data collected and analyzed by Alcoa is verified.

When collecting and analyzing environmental samples Alcoa follows guidelines contained in Quality Assurance Project Plans that have been approved by EPA to provide

adequate field and laboratory quality controls. The laboratories that perform the analyses of the environmental samples are independent laboratories that use methods accepted by EPA. Another method to verify analytical data is for EPA to collect split samples. These samples are typically collected by EPA at the same time that Alcoa is collecting samples and the samples are then sent to two different labs for subsequent analyses. EPA has collected split samples in the past and a comparison of sample results determined that Alcoa was providing accurate data. EPA will continue the practice of periodically collecting split samples.

ATTACHMENTS

RECORD OF DECISION

**ALUMINUM COMPANY OF AMERICA SITE
RIVERDALE, IOWA**

and

**MISSISSIPPI RIVER POOL 15 SITE
near RIVERDALE, IOWA**

Prepared by:

**United States Environmental Protection Agency
Region VII
901 North 5th Street
Kansas City, KS 66101**

September 2004

000748

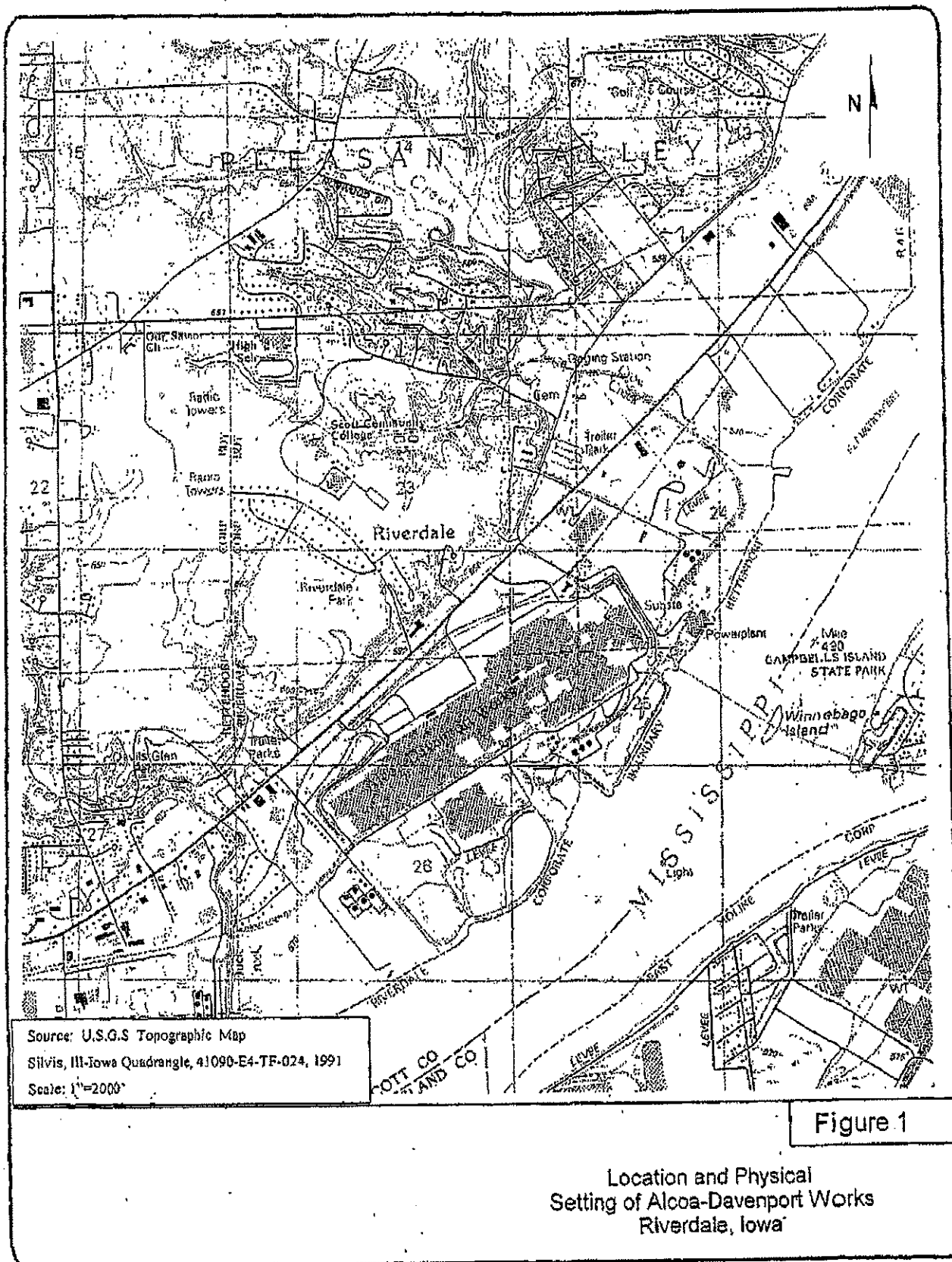


Figure 1

Location and Physical
 Setting of Alcoa-Davenport Works
 Riverdale, Iowa

000749

MISSISSIPPI RIVER POOL 15

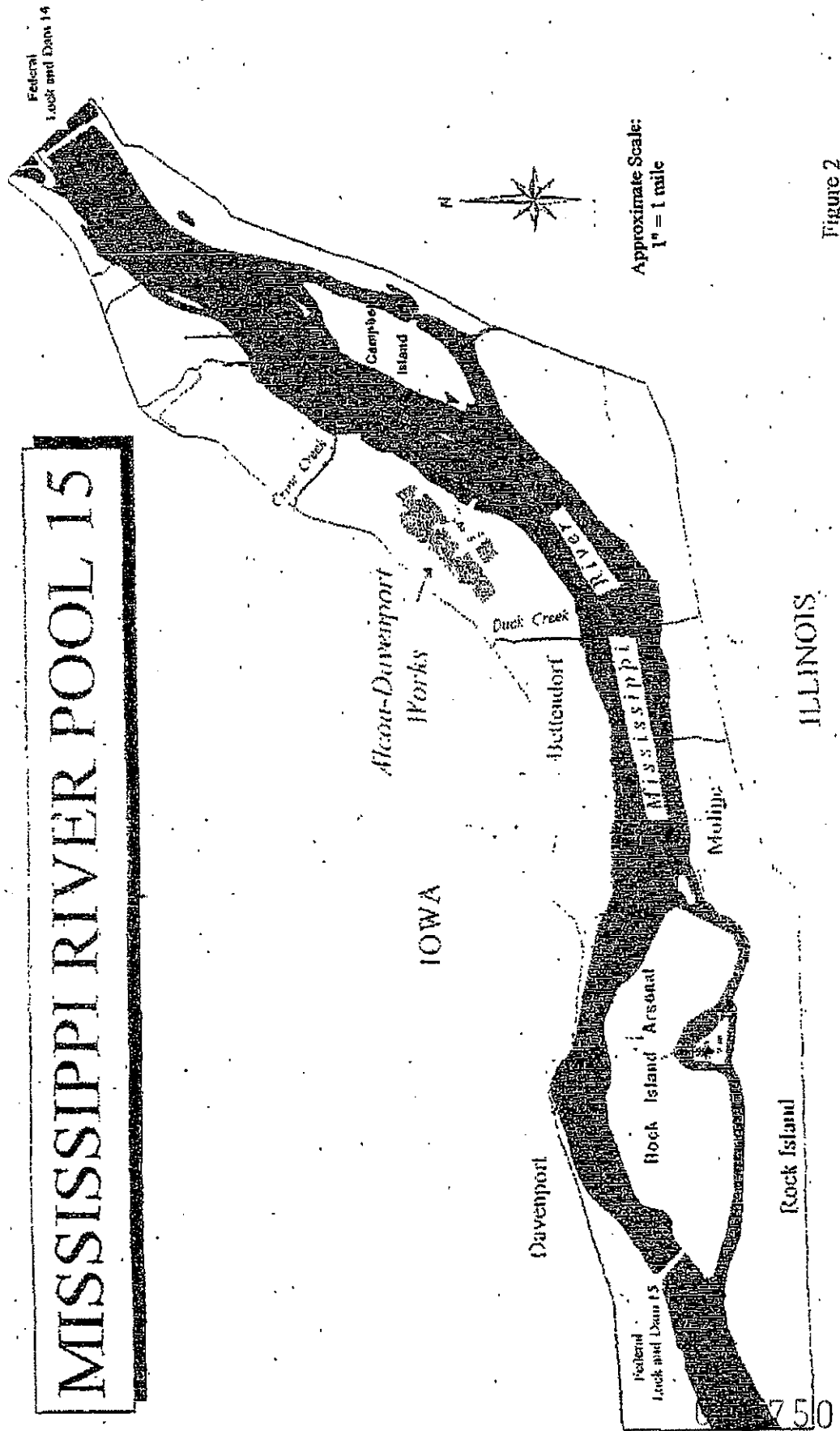


Figure 2

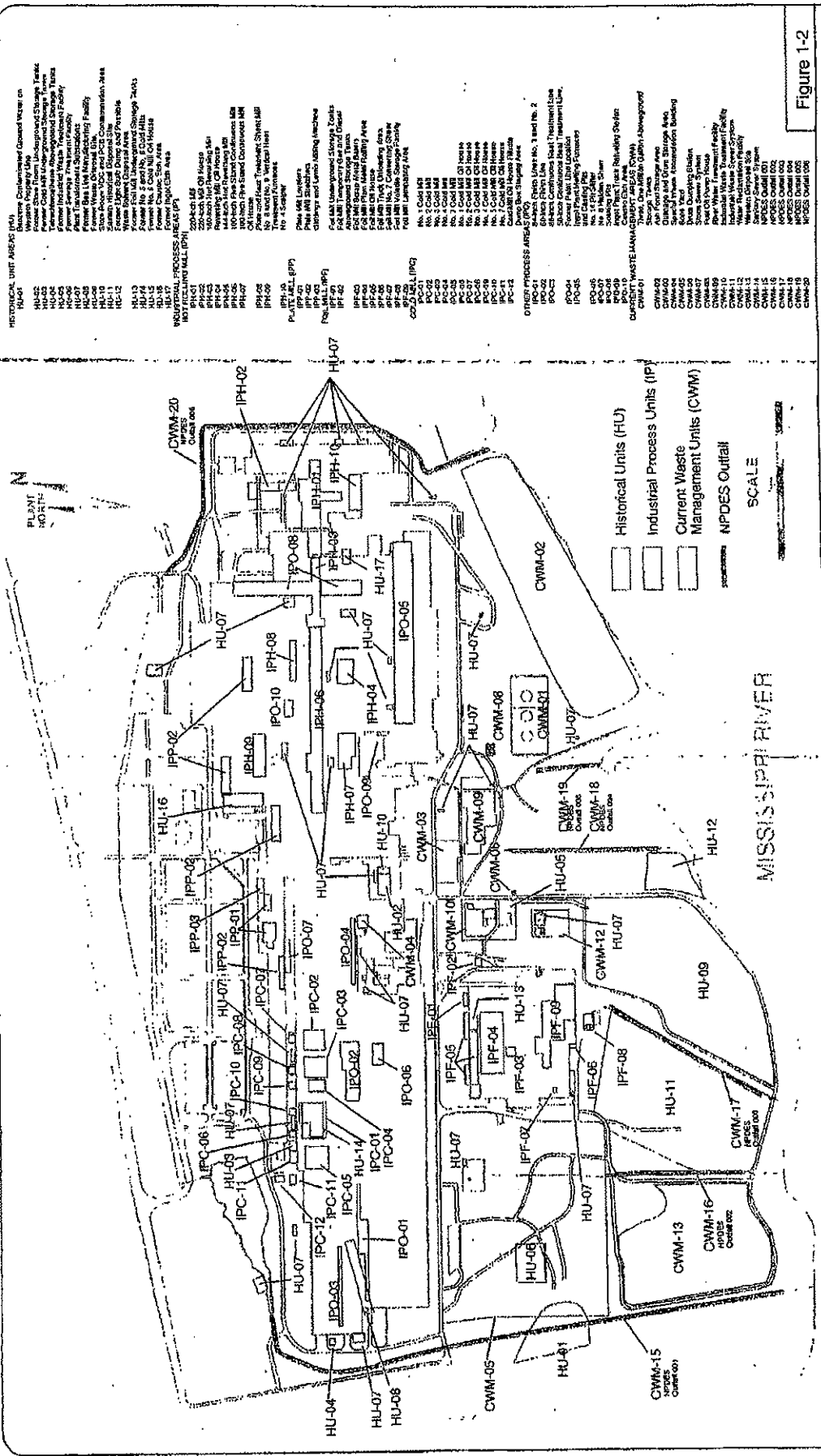


Figure 1-2

FSA Units
Alcoa-Davenport Works, Riverdale, Iowa

IT Corporation



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000751

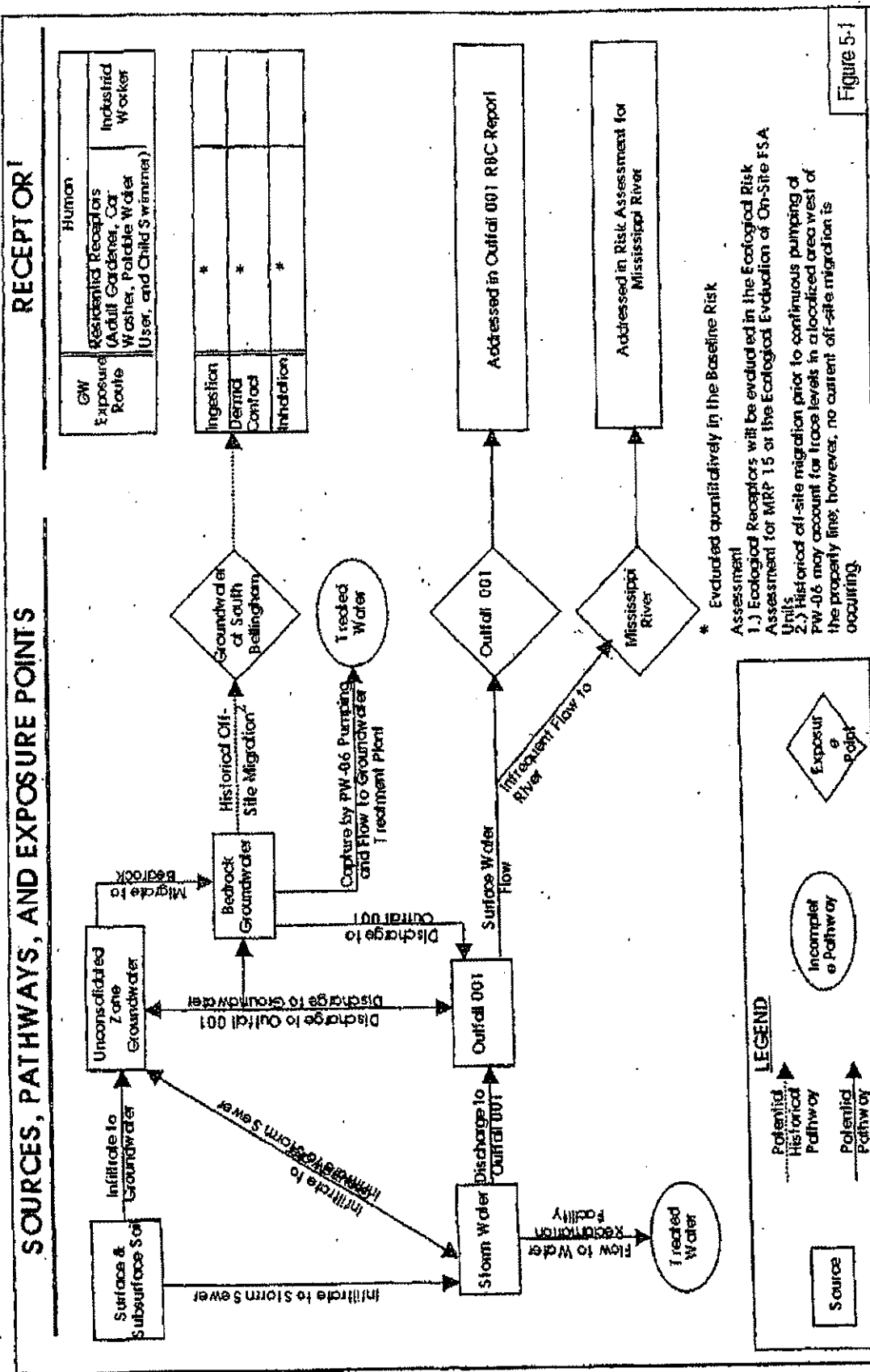


Figure 5-1

* Evaluated quantitatively in the Baseline Risk Assessment

Assessment

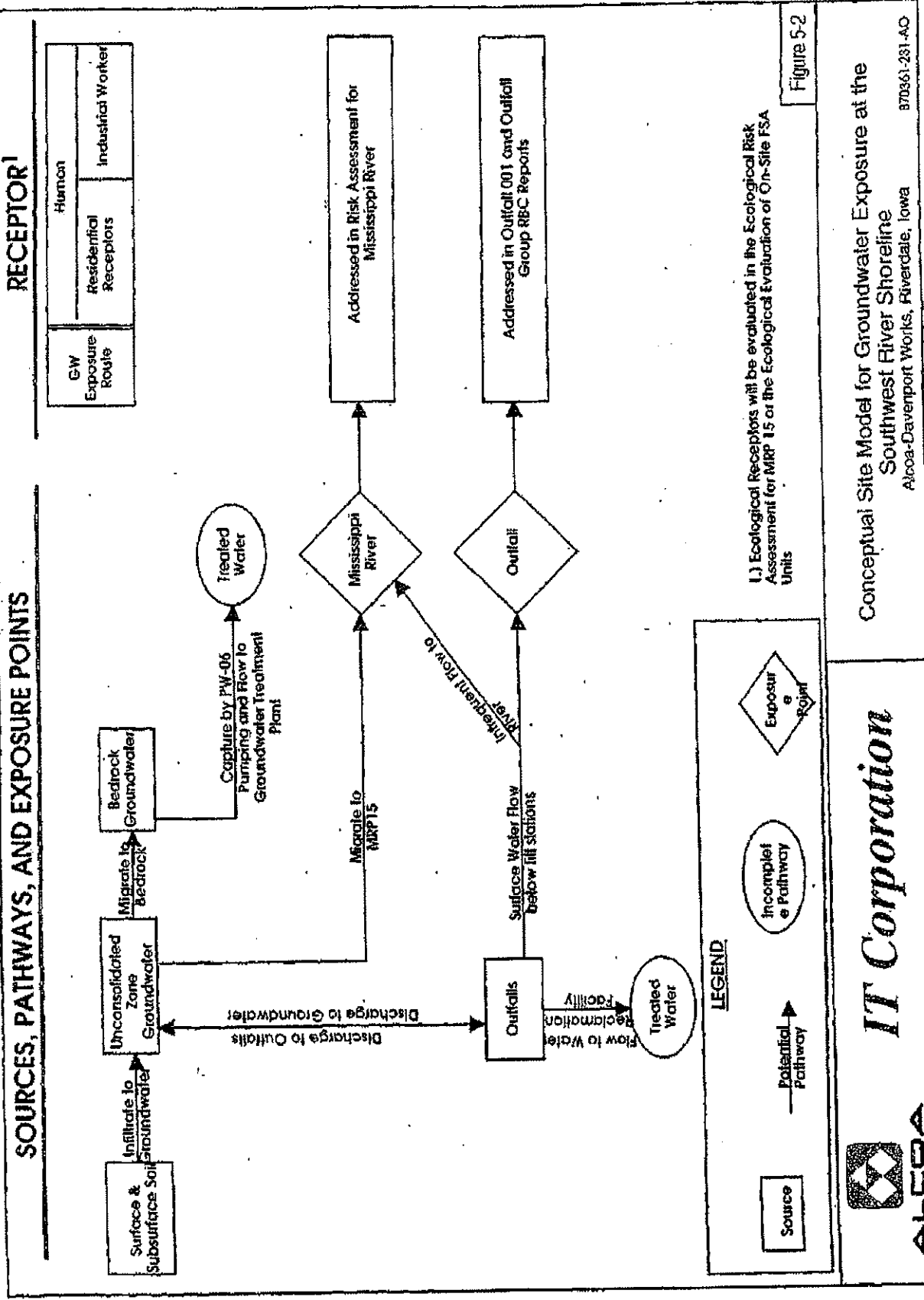
1.) Ecological Receptors will be evaluated in the Ecological Risk Assessment for MRP 15 or the Ecological Evaluation of On-Site FSA Units

2.) Historical off-site migration prior to continuous pumping of PW-06 may account for trace levels in a localized area west of the property line; however, no current off-site migration is occurring.

Conceptual Site Model for Groundwater Exposure at the Northwestern Facility Boundary
Alcoa-Davenport Works, Riverdale, Iowa

IT Corporation





1.) Ecological Receptors will be evaluated in the Ecological Risk Assessment for MRP 15 or the Ecological Evaluation of On-Site FSA Units

Figure 5-2

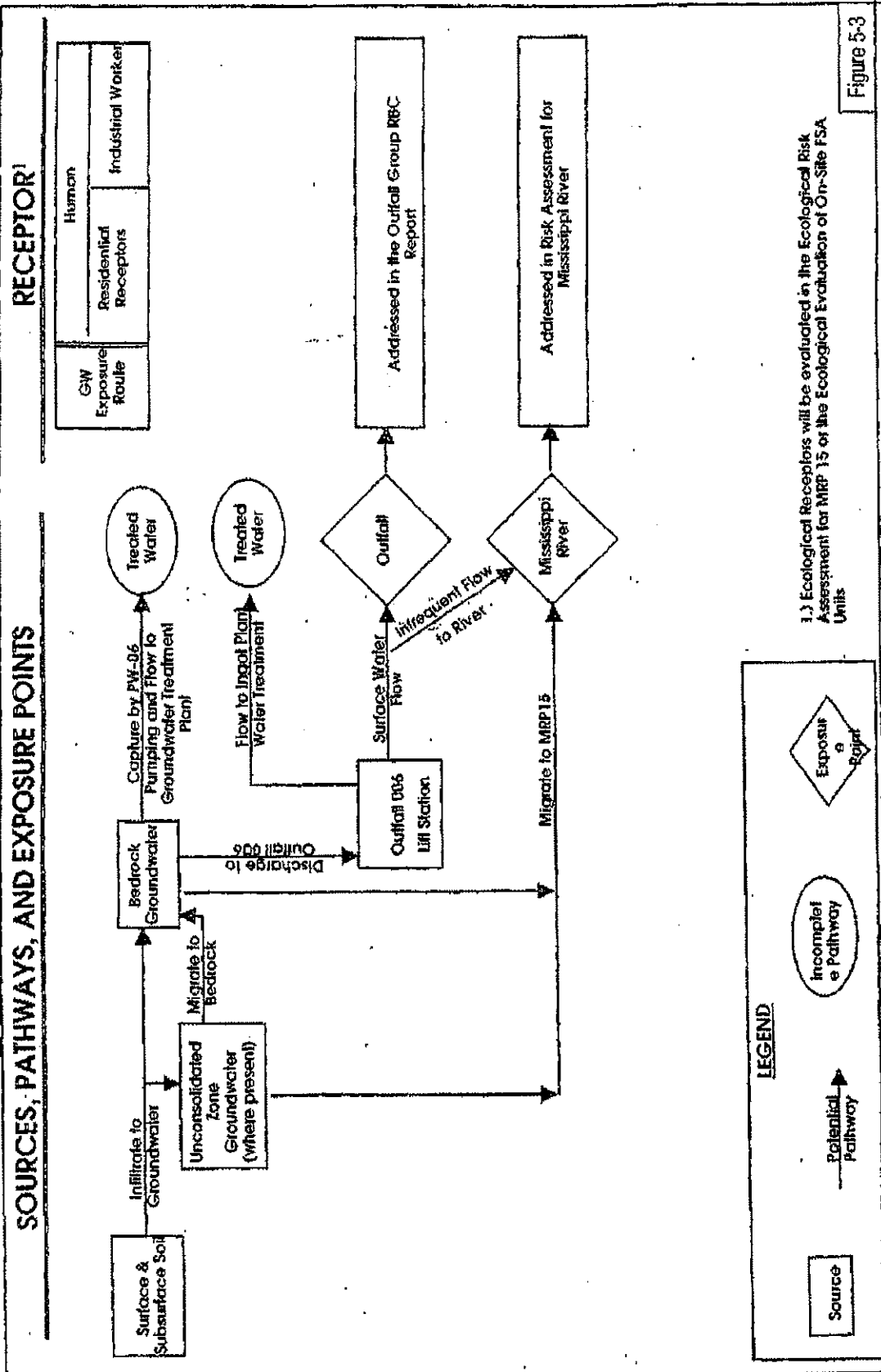
IT Corporation

Conceptual Site Model for Groundwater Exposure at the Southwest River Shoreline
Alcoa-Davenport Works, Riverdale, Iowa

870361-231-40




ALCOA



1.) Ecological Receptors will be evaluated in the Ecological Risk Assessment for MRP 15 or the Ecological Evaluation of On-Site FSA Units

Figure 5-3



ALESA

IT Corporation

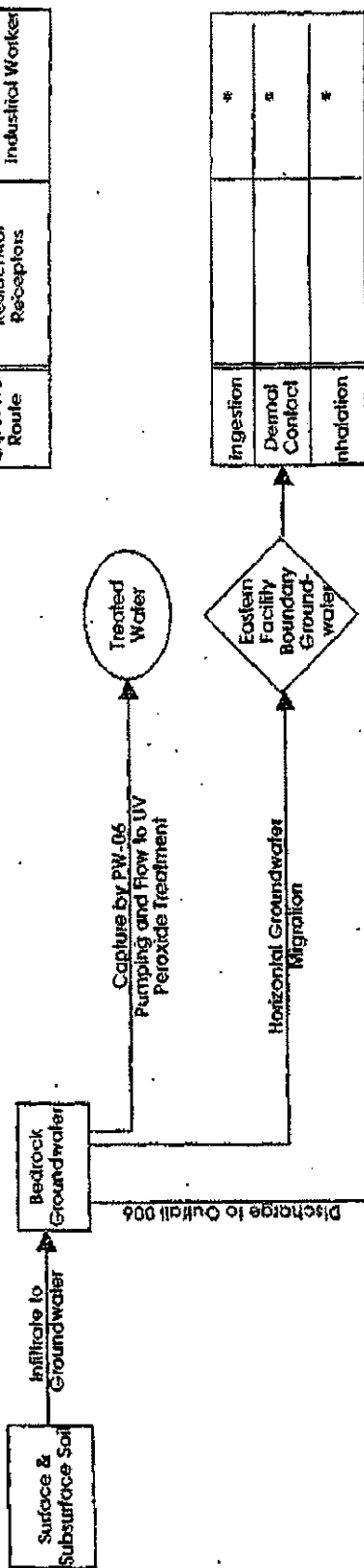
Conceptual Site Model for Groundwater Exposure at the
Southeast River Shoreline
Alcoa-Davenport Works, Riverdale, Iowa

870361-231-A0

SOURCES, PATHWAYS, AND EXPOSURE POINTS

RECEPTOR¹

GW Exposure Route	Human	
	Residential Receptors	Industrial Worker



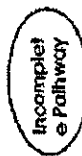
LEGEND



Source



Potential Pathway



Incomplete Pathway



Exposure Point

* Evaluated quantitatively in the Baseline Risk Assessment
 1.) Ecological Receptors will be evaluated in the Ecological Risk Assessment for MGP 15 or the Ecological Evaluation of On-Site FSA Units

Figure 5-4



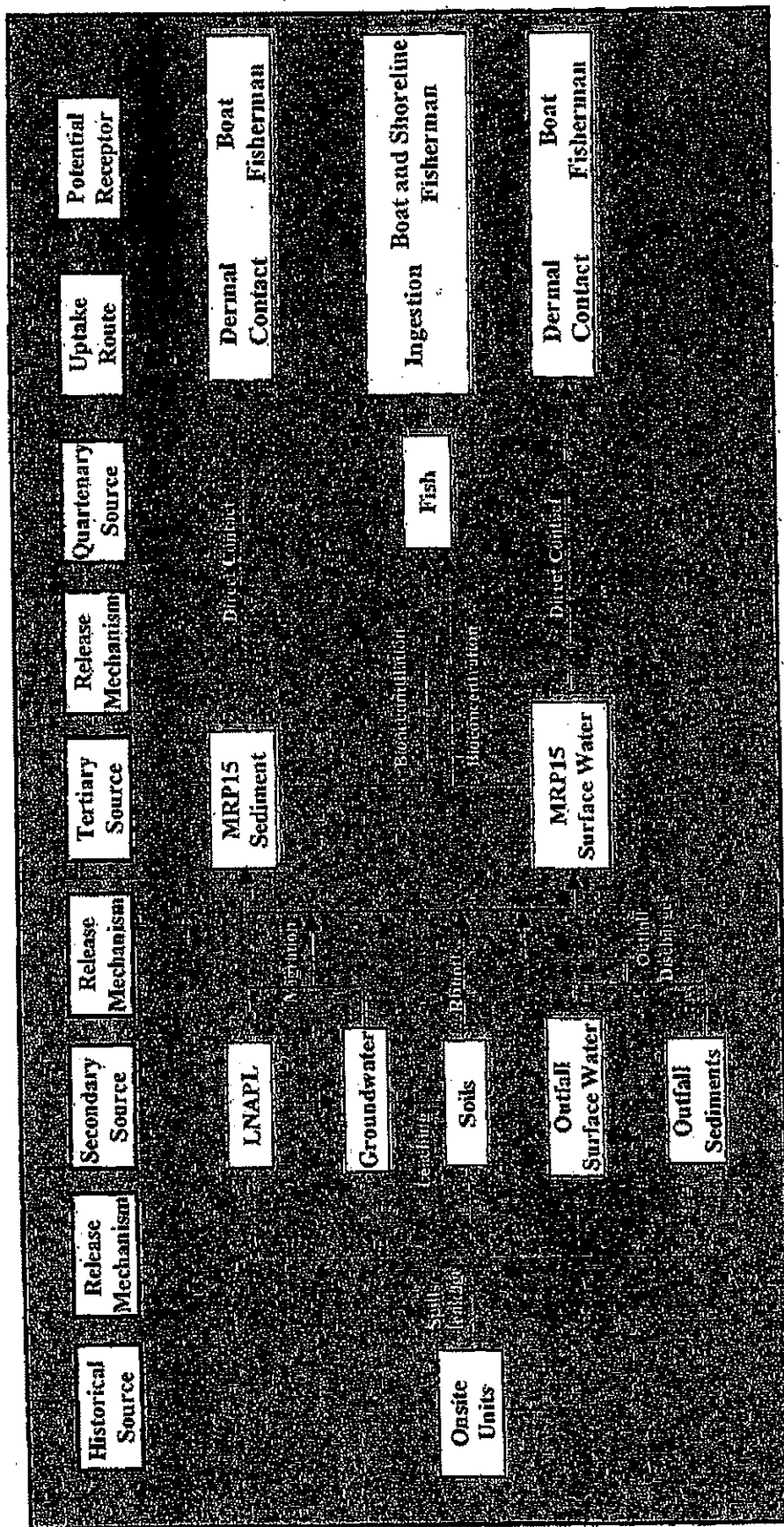
IT Corporation

Conceptual Site Model for Groundwater Exposure at the Eastern Facility Boundary
 Alcoa-Davenport Works, Riverdale, Iowa

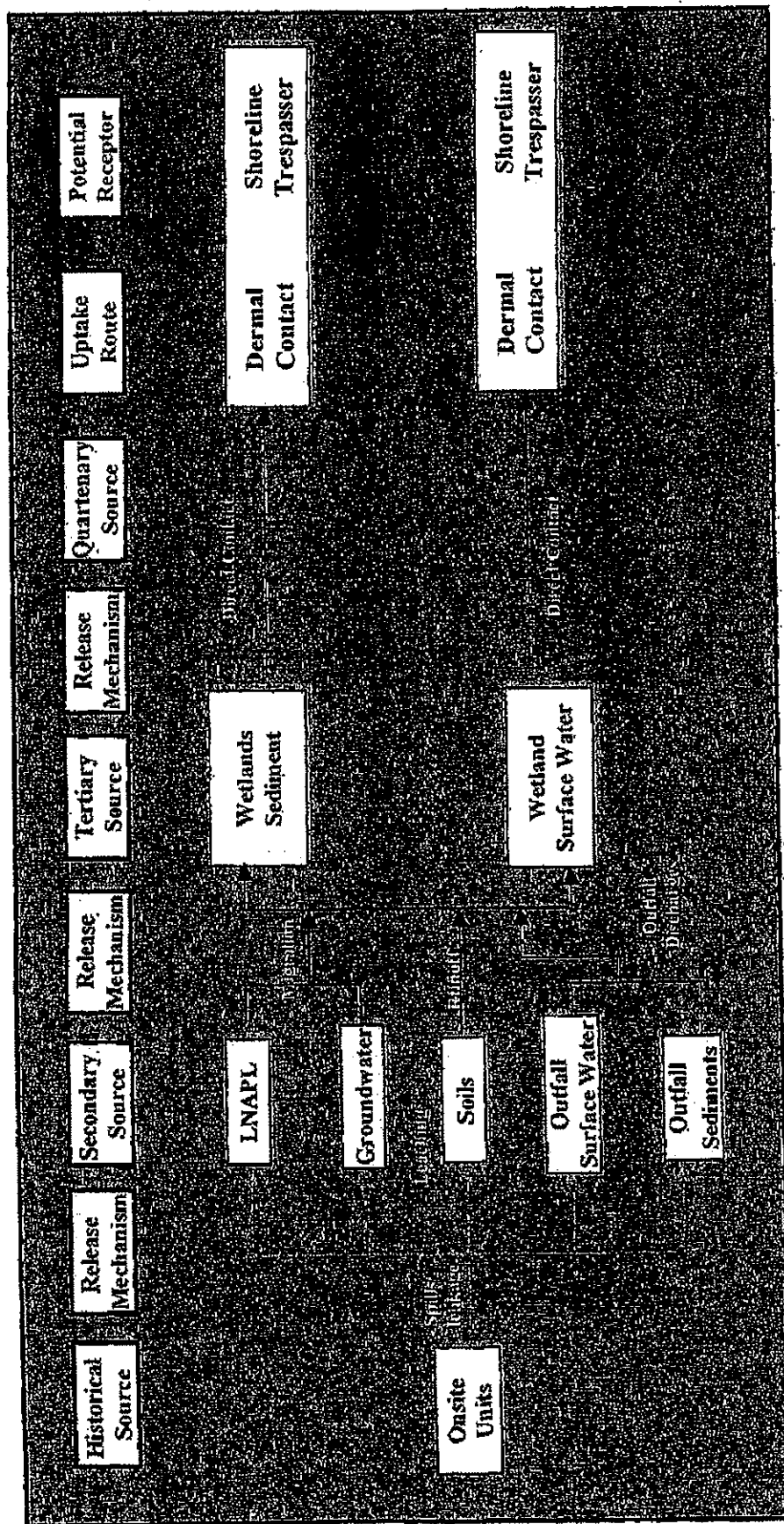
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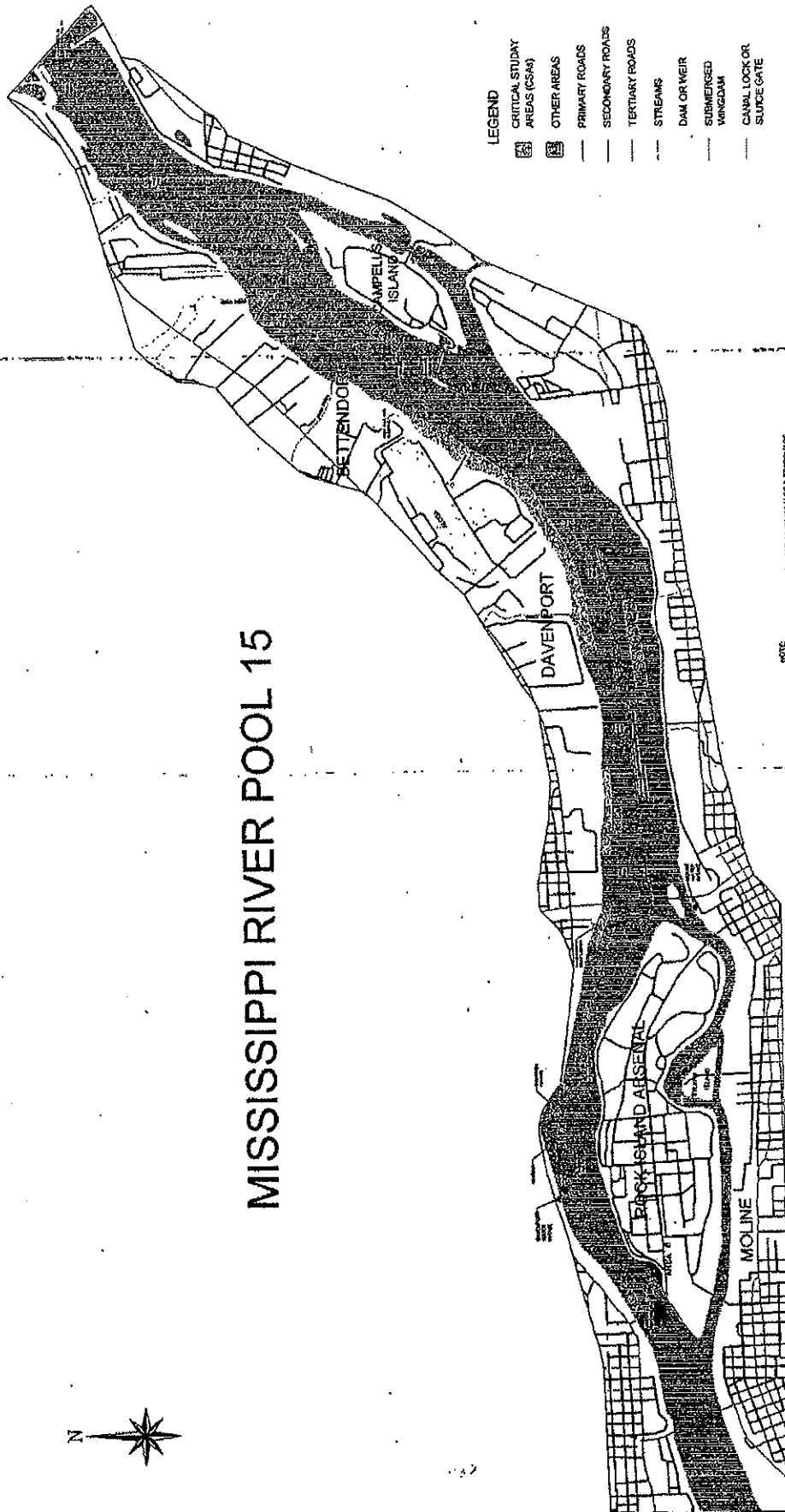
Mississippi River Pool 15, Alcoa-Davenport Works, Riverdale, Iowa



**Figure 3-2. Site Conceptual Exposure Model for Human Health Risk Assessment
On-Site Wetlands, Alcoa-Davenport Works, Riverdale, Iowa**



MISSISSIPPI RIVER POOL 15



SAMPLING AREA FOR SURFACE WATER AND SEDIMENT IN MRP 15	URS	ALCOA DAVENPORT, LA	DATE: 05/21/04	SCALE: NTS
			PROJ.# 20499874	FIG.# 2-2

STANDARD DRAWING FOR THE MISSISSIPPI RIVER POOL 15

000758



TABLE L-3-1
GROUNDWATER EXPOSURE POINT CONCENTRATION SUMMARY
SOUTH BELLINGHAM ROAD AREA, NORTHERN FACILITY BOUNDARY, ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Contact with Potable Water, Host Water, Pool Water

Chemical or Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	
1,1-Dichloroethane	ug/l	0.42	N/A	0.26	J	ug/l	0.26	Max	(1)	--	--	--	
1,2-Dichloroethane (total)	ug/l	7.07	N/A	20.90	J	ug/l	16.93	MaxAvg	(2)	--	--	--	
Benzene	ug/l	0.48	N/A	0.14	J	ug/l	0.14	Max	(1)	--	--	--	
Carbon disulfide	ug/l	0.59	N/A	2.40		ug/l	0.78	MaxAvg	(2)	--	--	--	
Chloroform	ug/l	0.99	N/A	(2.00)		ug/l	1.72	MaxAvg	(2)	--	--	--	
Chloromethane	ug/l	0.95	N/A	0.14	J	ug/l	0.14	Max	(1)	--	--	--	
Methylene chloride	ug/l	0.51	N/A	0.78	J	ug/l	0.55	MaxAvg	(2)	--	--	--	
Tetrachloroethene	ug/l	0.5	N/A	1.10		ug/l	0.51	MaxAvg	(2)	--	--	--	
Toluene	ug/l	0.59	N/A	2.10		ug/l	0.72	MaxAvg	(2)	--	--	--	
Trichloroethene	ug/l	0.67	N/A	2.35		ug/l	0.95	MaxAvg	(2)	--	--	--	

-- = Central Tendency EPC not used.

N/A = Not Applicable.

EPC calculation method is described in Section 5.5.3.2 of the Groundwater R1 Report.

Statistics: Maximum Detected Value (Max); Maximum Average Value (MaxAvg)

Rationale: (1) MaxAvg exceeded the Max so Max selected as EPC. (2) Too few data points (less than 5) to calculate 95% UCL so MaxAvg selected as EPC.

000760

TABLE 1-3-2
GROUNDWATER EXPOSURE POINT CONCENTRATION SUMMARY
SHALLOW AND INTERMEDIATE BEDROCK, EASTERN FACILITY BOUNDARY, ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Chemical or Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency			
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Rationale
1,1,1-Trichloroethane	ug/l	0.83	N/A	1.50		ug/l	1.50	Max	(1)	---	---	---	---	---
1,1-Dichloroethane	ug/l	0.30	N/A	0.25	J	ug/l	0.25	Max	(1)	---	---	---	---	---
1,2-Dichloroethane (total)	ug/l	0.48	N/A	0.44	J	ug/l	0.44	Max	(1)	---	---	---	---	---
2-Butanone	ug/l	53.30	N/A	150.00		ug/l	150.00	Max	(1)	---	---	---	---	---
Acetone	ug/l	16.30	N/A	39.00		ug/l	39.00	Max	(1)	---	---	---	---	---
Benzene	ug/l	0.39	N/A	0.10	J	ug/l	0.10	Max	(1)	---	---	---	---	---
Carbon disulfide	ug/l	0.61	N/A	0.82	J	ug/l	0.82	Max	(1)	---	---	---	---	---
Methylene chloride	ug/l	0.50	N/A	1.00		ug/l	1.00	Max	(1)	---	---	---	---	---
Tetrachloroethane	ug/l	1.53	N/A	3.60		ug/l	3.60	Max	(1)	---	---	---	---	---
Toluene	ug/l	0.61	N/A	0.84	J	ug/l	0.84	Max	(1)	---	---	---	---	---
Trichloroethane	ug/l	0.33	N/A	0.28	J	ug/l	0.28	Max	(1)	---	---	---	---	---

--- = Central Tendency EPC not used.

N/A = Not Applicable.

EPC calculation method is described in Section 5.5.3.2 of the Groundwater RI Report.

Statistics: Maximum Detected Value (Max)

Rationale: (1) Too few data points (less than 5) to calculate 95% UCL so Max selected as EPC.

000761

Table N-4
Exposure Point Concentrations
Hypothetical Future Off-Site Residential Exposure to Groundwater
Using Current Concentrations in On-Site H-Well Cluster
Alcoa-Davenport Works

Parameter	Groundwater EPC (ug/L)	Air EPCs (mg/m3)			
		Child Swimmer	Gardener	Car Washer	Potable Water User
1,1-Dichloroethane	1.5	1.8E-09	3.5E-04	1.7E-04	4.1E-02
1,2-Dichloroethene (total)	1600	2.0E-06	3.7E-01	1.9E-01	4.4E+01
Methylene Chloride	140	1.8E-07	3.3E-02	1.6E-02	3.8E+00
PCE	5275	5.9E-06	1.2E+00	6.2E-01	1.4E+02
Vinyl Chloride	33	4.5E-08	7.7E-03	3.8E-03	9.0E-01
TCE	825	9.7E-07	1.9E-01	9.6E-02	2.3E+01

TABLE L-1

SELECTION OF EXPOSURE PATHWAYS
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
ON-SITE									
Future Hypothetical	Groundwater	Potable well water or process water	Alcoa-Davenport Works	Industrial Worker	Adult	Dermal, Ingestion & Inhalation	On-site	None	Pathway is incomplete; groundwater is not used for drinking water or production purposes. A restrictive covenant was recently placed on groundwater within the fence line of the Alcoa-Davenport Works. The covenant between Scott County and Alcoa restricts current and future wells from being used as drinking water.
WESTERN FACILITY BOUNDARY									
Current/Future Potential	Groundwater	Indoor Vapors	S. Bellingham residential area	Residents	Adult	Inhalation	Off-site	Quantitative	Pathway assumed complete and evaluated in this risk assessment.
Future Potential	Groundwater	Water from insect water	S. Bellingham residential area	Resident Car Washers and Gardeners	Adult	Dermal, Ingestion & Inhalation	Off-site	Quantitative	Pathway assumed incomplete, but evaluated in this risk assessment as a conservative measure.
Future Potential	Groundwater	Water in pool	S. Bellingham residential area	Resident Swimmer	Child	Dermal, Ingestion & Inhalation	Off-site	Quantitative	Pathway assumed incomplete, but evaluated in this risk assessment as a conservative measure.
Future Hypothetical	Groundwater	Potable well water	S. Bellingham residential area	Resident Potable Water User	Adult	Dermal, Ingestion & Inhalation	Off-site	Quantitative	Pathway is considered incomplete as groundwater is not used for potable purposes but evaluated quantitatively in this risk assessment as a conservative measure.
Current/Future Potential	Groundwater	Surface water & sediment/soil	NPDES Outfall 001	Industrial Worker and Trespasser	Adult	Dermal, Ingestion & Inhalation*	On-site	None	Pathway was quantitatively evaluated in NPDES Outfall 001 RBC Report.
Future Hypothetical	Groundwater	Potable well water	Floodplain southwest of plant near Kelly Cottage	Resident Potable Water User	Adult	Dermal, Ingestion & Inhalation	Off-site	None	Groundwater exposure pathway is incomplete. Residential development is not possible.
RIVER SHORELINE									
Current/Future Potential	Groundwater	Surface water, sediment & fish	Mississippi River	Fishes	Adult	Dermal & Ingestion	Off-site	None	Pathway was quantitatively evaluated in Mississippi River Pool (MRP) IS Risk Assessment.
Current/Future Potential	Groundwater	Surface water & sediment	Mississippi River	Trespasser	Adult	Dermal & Ingestion	Off-site	None	Pathway was quantitatively evaluated in MRP IS Risk Assessment.
Current/Future Potential	Groundwater	Surface water & sediment/soil	Outfalls 002, 003, 004, 005, and southern portion of Outfall 006	Industrial Worker and Trespasser	Adult	Dermal, Ingestion & Inhalation*	On-site	None	Pathway to be evaluated in NPDES Outfall Group RBC Report.
EASTERN FACILITY BOUNDARY									
Future Potential/Hypothetical	Groundwater	Process water and potable well water	Industrial facility east of Alcoa	Industrial Worker	Adult	Dermal, Ingestion & Inhalation	Off-site	Quantitative	Pathway is considered incomplete as groundwater is not used for potable purposes but evaluated quantitatively in this risk assessment as a conservative measure.
Current/Future Potential	Groundwater	Surface water & sediment/soil	Outfall 006	Industrial Worker	Adult	Dermal, Ingestion & Inhalation*	On-site	None	Pathway to be evaluated in NPDES Outfall Group RBC Report.

* Inhalation does not apply to surface water.

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Table N-1
Selection of Groundwater Exposure Pathways
Hypothetical Future Off-Site Residential Exposure to Groundwater
Using Current Concentrations in On-Site H-Well Cluster
Alcoa-Davenport Works

Scenario Timeframe	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future Hypothetical	Indoor Vapors	Hypothetical off-site residence	Residents	Adult	Inhalation	Off-site	Quantitative	Pathway is currently incomplete at H well concentrations but the pathway is evaluated at H well concentrations as a conservative measure.
Future Hypothetical	Water from hose	Hypothetical off-site residence	Resident Car Washers and Gardeners	Adult	Dermal, Ingestion & Inhalation	Off-site	Qualitative	Pathway is currently incomplete at H well concentrations but the pathway is evaluated at H well concentrations as a conservative measure.
Future Hypothetical	Water in pool	Hypothetical off-site residence	Resident Swimmer	Child	Dermal, Ingestion & Inhalation	Off-site	Quantitative	Pathway is currently incomplete at H well concentrations but the pathway is evaluated at H well concentrations as a conservative measure.
Future Hypothetical	Potable well water	Hypothetical off-site residence	Resident Potable Water User	Adult	Dermal, Ingestion & Inhalation	Off-site	Quantitative	Pathway is currently incomplete at H well concentrations but the pathway is evaluated at H well concentrations as a conservative measure.

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TABLE L-6-1
CANCER TOXICITY DATA -- ORAL/DERMAL
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
1,1,1-trichloroethane	N/A	N/A	N/A	N/A	D	IRIS ONLINE	10/08/01
1,1-dichloroethane	N/A	N/A	N/A	N/A	C	IRIS ONLINE	10/08/01
1,2-dichloroethane	N/A	N/A	N/A	N/A	D	IRIS ONLINE	10/08/01
2-Butanone (MEX)	N/A	N/A	N/A	N/A	D	IRIS ONLINE	10/08/01
Acetone	N/A	N/A	N/A	N/A	D	IRIS ONLINE	10/08/01
Benzene	0.055	1	0.055	(mg/kg-d) ¹	A	IRIS ONLINE	10/08/01
Carbon disulfide	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	0.0081	1	0.0081	(mg/kg-d) ¹	B2	IRIS ONLINE	10/08/01
Chloromethane	0.013	1	0.013	(mg/kg-d) ¹	N/A	HEAST	N/A
Methylene chloride	0.0075	1	0.0075	(mg/kg-d) ¹	B2	IRIS ONLINE	10/08/01
PCE	0.052	1	0.052	(mg/kg-d) ¹	N/A	NCEA	N/A
Toluene	N/A	N/A	N/A	N/A	D	IRIS ONLINE	10/08/01
TCE	0.011	1	0.011	(mg/kg-d) ²	N/A	NCEA	N/A

N/A = Not Applicable

IRIS = Integrated Risk Information System

HEAST = Health Effects Assessment Summary Tables

N/A = Information Not Available

(1) Adjustment equation: Oral CSF/Oral to Dermal Adjustment Factor = Adjusted Dermal CSF.

(2) Dates when IRIS was searched, date of HEAST, or date of the article provided by NCEA, CSFs

were obtained from 2000 EPA Region IX PRG tables.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and

inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

Table N-5
Toxicity Criteria and Permeability Coefficients for Vinyl Chloride
Hypothetical Future Off-Site Residential Exposure to Groundwater
Using Current Concentrations in On-Site H-Well Cluster
 Alcoa-Davenport Works

Constituent	Cancer Slope Factors (CSF) (mg/kg-d) ⁻¹				Reference Doses (RfD) (mg/kg-d)				Permeability Coefficient (Kp) cm/hr	
	Oral (Ref.)	Inhalation (Ref.)	Dermal (Ref.)	Dermal (Ref.)	Oral (Ref.)	Inhalation (Ref.)	Dermal (Ref.)	Dermal (Ref.)	(Ref.)	(Ref.)
Vinyl Chloride (child)	1.5	(1)	0.031	(4)	1.5	(2)	0.003	(1)	0.003	(2)
Vinyl Chloride (adult)	0.75	(1)	0.016	(1)	0.75	(2)	0.003	(1)	0.003	(2)

-- Not Applicable

(1) Online Integrated Risk Information System - IRIS (EPA, 2001)

(2) Value reflects Oral-to-Dermal Adjustment Factor (1.0) multiplied by oral CSF or RfD; references correspond to references for oral value.

(3) Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance, External Review Draft (EPA, 1998b).

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TABLE L-6-2
CANCER TOXICITY DATA -- INHALATION
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Chemical of Potential Concern	Unit Risk (1)	Units	Adjustment (1)	Inhalation Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YYYY)
1,1,1-Trichloroethane	N/A	N/A	N/A	N/A	N/A	D	IRIS ONLINE	11/27/01
1,1-dichloroethane	N/A	N/A	N/A	NAV	N/A	C	IRIS ONLINE	11/27/01
1,2-dichloroethane	N/A	N/A	N/A	N/A	N/A	D	IRIS ONLINE	11/27/01
2-Butanone (MEK)	N/A	N/A	N/A	N/A	N/A	D	IRIS ONLINE	11/27/01
Acetone	N/A	N/A	N/A	N/A	N/A	D	IRIS ONLINE	11/27/01
Benzene	N/A	N/A	N/A	0.027	(mg/kg-d) ⁻¹	A	IRIS ONLINE	11/27/01
Carbon disulfide	N/A	N/A	N/A	NAV	(mg/kg-d) ⁻¹	NAV	N/A	N/A
chloroform	N/A	N/A	N/A	0.001	(mg/kg-d) ⁻¹	B2	IRIS ONLINE	11/27/01
chloromethane	N/A	N/A	N/A	0.0063	(mg/kg-d) ⁻¹	NAV	N/A	N/A
ethylene chloride	N/A	N/A	N/A	0.00165	(mg/kg-d) ⁻¹	B2	IRIS ONLINE	11/27/01
PCE	N/A	N/A	N/A	0.002	(mg/kg-d) ⁻¹	NAV	N/A	N/A
toluene	N/A	N/A	N/A	N/A	N/A	D	IRIS ONLINE	11/27/01
TCE	N/A	N/A	N/A	0.008	(mg/kg-d) ⁻¹	NAV	N/A	N/A

IRIS = Integrated Risk Information System

HEAST = Health Effects Assessment Summary Tables

NAV = Information Not Available

(1) CSFs obtained directly from Region IX PRG tables; no further adjustment performed.

(2) Dates when IRIS was searched, date of HEAST, or date of the article provided by NCEA. CSFs

were obtained from 2000 EPA Region IX PRG tables.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and

inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

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TABLE 1-5-1
NON-CANCER TOXICITY DATA - ORAL/DERMAL
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ (3)	Dates of RfD: Target Organ (4) (MM/DD/YYYY)
1,1,1-Trichloroethane	NAV	2E-02	(mg/kg-d)	1	2E-02	(mg/kg-d)	N/A	N/A	NCEA	NAV
1,1-dichloroethane	Chronic	1E-01	(mg/kg-d)	1	1E-01	(mg/kg-d)	Lungs	1000	HEAST	07/01/97
1,2-dichloroethene	Chronic	1E-02	(mg/kg-d)	1	1E-02	(mg/kg-d)	Liver	1000	HEAST	07/01/97
2-Butanone (MEK)	Chronic	6E-01	(mg/kg-d)	1	6E-01	(mg/kg-d)	Decreased Fetal Birth Weight	3000	IRIS ONLINE	10/08/01
Acetone	Chronic	1E-01	(mg/kg-d)	1	1E-01	(mg/kg-d)	Liver/Kidney	1000	IRIS ONLINE	10/08/01
Benzene	NAV	3E-03	(mg/kg-d)	1	3E-03	(mg/kg-d)	Blood	1000	NCEA	NAV
Carbon disulfide	Chronic	1E-01	(mg/kg-d)	1	1E-01	(mg/kg-d)	Fetal Toxicity	100	IRIS ONLINE	10/08/01
Chloroform	Chronic	1E-02	(mg/kg-d)	1	1E-02	(mg/kg-d)	Liver	100	IRIS ONLINE	10/08/01
Chloroethane	NAV	NAV	(mg/kg-d)	1	N/A	(mg/kg-d)	N/A	N/A	N/A	N/A
1,1-dichloroethene	Chronic	6E-02	(mg/kg-d)	1	6E-02	(mg/kg-d)	Liver	100	IRIS ONLINE	10/08/01
PCE	Chronic	1E-02	(mg/kg-d)	1	1E-02	(mg/kg-d)	Liver	1000	IRIS ONLINE	10/08/01
Toluene	Chronic	2E-01	(mg/kg-d)	1	2E-01	(mg/kg-d)	Liver/Kidney	1000	IRIS ONLINE	10/08/01
TCE	Chronic	NAV	(mg/kg-d)	1	N/A	(mg/kg-d)	N/A	N/A	N/A	NAV

N/A = Not Applicable

NAV = Information Not Available

(1) EPA, 1998b. Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, NCEA-W-0364, May 7, 1998.

(2) Adjustment equation: Oral RfD x Oral to Dermal Adjustment Factor = Adjusted Dermal RfD.

(3) RfDs and sources of target organs were obtained from 2000 EPA Region IX PRG tables.

(4) Dates are applicable to target organs and uncertainty/modifying factors.

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TABLE L-5-2
NON-CANCER TOXICITY DATA -- INHALATION
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation - RIC	Units	Adjusted Inhalation RID (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RIC/RID (2): Target Organ	Dates (3) (MM/DD/YY)
1,1,1-Trichloroethane	NAV	N/A	N/A	0.29	(mg/kg-d)	N/A	NAV	NCEA	NAV
1,1-dichloroethane	NAV	N/A	N/A	0.14	(mg/kg-d)	Lungs	NAV	HEAST	07/01/97
1,2-dichloroethane	Chronic	N/A	N/A	NAV	(mg/kg-d)	Liver	NAV	HEAST	07/01/97
2-Butanone (MEK)	Chronic	N/A	N/A	0.29	(mg/kg-d)	Decreased Fetal Birth Weight	3000	IRIS ONLINE	10/08/01
Acetone	NAV	N/A	N/A	NAV	(mg/kg-d)	Liver	NAV	HEAST	07/01/97
Benzene	NAV	N/A	N/A	0.0017	(mg/kg-d)	Blood	NAV	NCEA	NAV
carbon disulfide	Chronic	N/A	N/A	0.2	(mg/kg-d)	Nervous System	30	IRIS ONLINE	10/08/01
chloroform	NAV	N/A	N/A	0.000086	(mg/kg-d)	Liver	NAV	HEAST	07/01/97
chloromethane	NAV	N/A	N/A	0.086	(mg/kg-d)	N/A	NAV	HEAST	07/01/97
methylene chloride	Chronic	N/A	N/A	0.86	(mg/kg-d)	Liver	NAV	HEAST	07/01/97
POE	NAV	N/A	N/A	0.11	(mg/kg-d)	Liver	NAV	HEAST	07/01/97
toluene	Chronic	N/A	N/A	0.114	(mg/kg-d)	Nervous System	300	IRIS ONLINE	10/08/01
TCE	NAV	N/A	N/A	0.006	(mg/kg-d)	N/A	NAV	NCEA	NAV

N/A = Not Applicable

NAV = Information Not Available

- (1) RIDs were obtained from EPA Region IX PRG tables; no further adjustment performed. Note that the route-to-route extrapolated inhalation toxicity values in EPA Region IX PRG tables for acetone and 1,2-dichloroethane were not used in the quantitative baseline risk assessment. This is addressed in the uncertainty section of the baseline risk assessment.
- (2) RIDs and sources of target organs were obtained from 2000 EPA Region IX PRG tables.
- (3) Dates are applicable to target organs and uncertainty/modifying factors.

TABLE L-9-1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPOs
REASONABLE MAXIMUM EXPOSURE
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeframe: Current/Future Potential
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Inhalation of Vapors	1,1-Dichloroethane	N/A	N/A	N/A	NC	1,1-Dichloroethane	Lungs	N/A	3.68E-08	N/A	3.68E-08
			1,2-Dichloroethane	N/A	N/A	N/A	NC	1,2-Dichloroethane	Liver	N/A	2.90E-05	N/A	2.90E-05
			Benzene (1)	N/A	3.44E-11	N/A	3.44E-11	Benzene (1)	NAV	N/A	N/A	N/A	N/A
			Carbon Disulfide	N/A	N/A	N/A	NC	Carbon Disulfide	Fetal Toxicity	N/A	4.95E-07	N/A	4.95E-07
			Chloroform (1)	N/A	8.55E-10	N/A	8.55E-10	Chloroform (1)	Liver	N/A	N/A	N/A	N/A
			Chloromethane (1)	N/A	1.25E-10	N/A	1.25E-10	Chloromethane (1)	Kidney	N/A	4.00E-06	N/A	4.00E-06
			Methylene Chloride	N/A	3.47E-12	N/A	3.47E-12	Methylene Chloride	Liver	N/A	5.75E-09	N/A	5.75E-09
			PCE (1)	N/A	2.45E-11	N/A	2.45E-11	PCE (1)	Liver	N/A	N/A	N/A	N/A
			Toluene	N/A	N/A	N/A	NC	Toluene	Liver/Kidney	N/A	1.35E-07	N/A	1.35E-07
			TCE (1)	N/A	8.30E-11	N/A	8.30E-11	TCE (1)	NAV	N/A	N/A	N/A	N/A
				Total Risk Across Groundwater and All Exposure Routes						Total Hazard Index Across Groundwater and All Exposure Routes			
				1.12E-09						3.37E-05			
				1.12E-09									

(1) Only Provisional Toxicity Criteria Available

NAV = Information Not Available

N/A = Not Applicable

NC = Non-Carcinogenic

Total (Liver) HI =	2.97E-05
Total (Kidney) HI =	4.14E-06
Total (Lungs) HI =	3.68E-08

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TABLE L-9-2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeframe: Future Potential
Receptor Population: Resident Car Washer
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Contact with Groundwater	1,1-Dichloroethane	NC	NC	NC	NC	1,1-Dichloroethane	Lungs	2.20E-07	6.33E-08	1.26E-07	4.10E-07
			1,2-Dichloroethane	NC	NC	NC	NC	1,2-Dichloroethane	Liver	1.43E-04	5.77E-05	4.78E-05	2.45E-04
			Benzene (1)	2.79E-10	5.52E-11	1.07E-09	1.40E-09	Benzene (1)	NAV	3.95E-08	2.81E-06	1.91E-05	2.18E-05
			Carbon Disulfide	NC	NC	NC	NC	Carbon Disulfide	Fetal Toxicity	6.59E-07	1.33E-07	4.52E-07	1.24E-06
			Chloroform (1)	3.80E-10	2.04E-09	1.32E-10	2.55E-09	Chloroform (1)	Liver	1.45E-05	6.82E-04	5.04E-06	7.02E-04
			Chloroethane (1)	6.59E-11	1.29E-11	5.01E-11	1.29E-10	Chloroethane (1)	Kidney	N/A	5.65E-08	N/A	5.55E-08
			Methylene Chloride	1.48E-10	1.33E-11	2.12E-11	1.84E-10	Methylene Chloride	Liver	7.75E-07	2.18E-08	1.10E-07	9.07E-07
			PCE (1)	9.81E-10	1.48E-11	2.27E-09	3.25E-09	PCE (1)	Liver	4.31E-08	1.56E-07	1.02E-05	1.47E-05
			Toluene	NC	NC	NC	NC	Toluene	Liver/Kidney	3.04E-07	2.15E-07	2.98E-07	9.18E-07
			TCE (1)	3.79E-10	8.33E-11	2.44E-10	7.06E-10	TCE (1)	NAV	N/A	5.40E-06	N/A	5.40E-06
Total Risk Across Groundwater				8.21E-09				Total Hazard Index Across Groundwater and All Exposure Routes					9.98E-04
Total Risk Across Groundwater and All Exposure Routes				8.21E-09									

(1) Only Provisional Toxicity Criteria Available NAV = Information Not Available	Total [Liver] HI =	9.67E-04
	Total [Kidney] HI =	9.73E-07
	Total [Lungs] HI =	4.10E-07

(1) Only Provisional Toxicity Criteria Available

NAV = Information Not Available

N/A = Not Applicable

NC = Non-Carcinogenic

Total [Lined] HI =	9.67E-04
Total [Kidney] HI =	9.79E-07
Total [Lungs] HI =	4.10E-07

000771

TABLE L-9-3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeframe: Future Potential
Receptor Population: Resident Gardener
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Contact with Groundwater	1,1-Dichloroethane	NC	NC	NC	NC	1,1-Dichloroethane	Lungs	3.17E-07	9.15E-08	6.72E-08	4.78E-07
			1,2-Dichloroethane	NC	NC	NC	NC	1,2-Dichloroethane	Liver	2.07E-04	8.24E-05	4.93E-05	3.39E-04
			Benzene (1)	4.03E-10	7.99E-11	1.09E-09	1.57E-09	Benzene (1)	NAV	5.70E-06	4.09E-06	1.54E-05	2.51E-05
			Carbon Disulfide	NC	NC	NC	NC	Carbon Disulfide	Renal Toxicity	9.52E-07	1.92E-07	4.92E-07	1.61E-06
			Chloroform (1)	5.49E-10	2.94E-09	1.35E-10	3.63E-09	Chloroform (1)	Liver	2.10E-05	9.85E-04	5.15E-06	1.01E-03
			Chloroethane (1)	9.52E-11	1.86E-11	6.91E-12	1.21E-10	Chloroethane (1)	Kidney	N/A	8.01E-08	N/A	8.01E-08
			Methylene Chloride	2.16E-10	1.92E-11	2.17E-11	2.57E-10	Methylene Chloride	Liver	1.12E-06	3.15E-08	1.12E-07	1.26E-06
			PCE (1)	1.39E-09	2.15E-11	2.32E-09	3.73E-09	PCE (1)	Liver	6.23E-06	2.29E-07	1.04E-05	1.69E-05
			Toluene	NC	NC	NC	NC	Toluene	Liver/Kidney	4.40E-07	3.11E-07	4.12E-07	1.16E-06
			TCE (1)	5.47E-10	1.20E-10	2.52E-10	9.19E-10	TCE (1)	NAV	N/A	7.80E-06	N/A	7.80E-06
Total Risk Across Groundwater and All Exposure Routes				1.02E-08				Total Hazard Index Across Groundwater and All Exposure Routes					1.41E-03
				1.02E-08									

Total [Liver] HI =	1.37E-03
Total [Kidney] HI =	1.24E-06
Total [Lungs] HI =	4.76E-07

(1) Only Provisional Toxicity Criteria Available

(1) Only Provisional Toxicity Criteria Available

NAV = Information Not Available

N/A = Not Applicable

NC = Non-Carcinogenic

Total [Liver] HI =	1.37E-03
Total [Kidney] HI =	1.24E-06
Total [Lungs] HI =	4.76E-07

000772

TABLE L-9-4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPOS
REASONABLE MAXIMUM EXPOSURE
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario: Unsaturation: Future Hypothetical
Receptor Population: Resident Potable Water User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Contact with Groundwater	1,1-Dichloroethane	NC	NC	NC	NC	1,1-Dichloroethane	Lungs	7.17E-05	9.67E-05	2.92E-06	1.71E-04
			1,2-Dichloroethane	NC	NC	NC	NC	1,2-Dichloroethane	Liver	4.64E-02	8.81E-02	2.15E-03	1.37E-01
			Benzene (1)	9.04E-08	8.43E-08	4.74E-08	2.22E-07	Benzene (1)	NAV	1.28E-03	4.29E-03	6.70E-04	6.23E-03
			Carbon Disulfide	NC	NC	NC	NC	Carbon Disulfide	Fetal Toxicity	2.14E-04	2.03E-04	2.01E-05	4.37E-04
			Chloroform (1)	1.23E-07	3.11E-06	5.86E-08	3.24E-06	Chloroform (1)	Liver	4.71E-03	1.04E+00	2.24E-04	1.05E+00
			Chloromethane (1)	2.14E-08	1.97E-08	3.01E-10	4.13E-08	Chloromethane (1)	Kidney	N/A	8.47E-05	N/A	8.47E-05
			Methylene Chloride	4.84E-08	2.02E-08	9.44E-10	8.98E-08	Methylene Chloride	Liver	2.51E-04	3.33E-05	4.90E-06	2.89E-04
			PCE (1)	3.11E-07	2.28E-08	1.01E-07	4.35E-07	PCE (1)	Liver	1.40E-03	2.42E-04	4.53E-04	2.09E-03
			Toluene	NC	NC	NC	NC	Toluene	Liver/Kidney	9.88E-05	3.29E-04	1.80E-05	4.45E-04
			TCE (1)	1.23E-07	1.27E-07	1.10E-08	2.51E-07	TCE (1)	NAV	N/A	8.25E-03	N/A	8.25E-03
Total Risk Across Groundwater				4.27E-06				Total Hazard Index Across Groundwater and All Exposure Routes					1.20E+00
Total Risk Across Groundwater and All Exposure Routes				4.27E-06				Total (Liver) HQ =					1.16E+00
								Total (Kidney) HQ =					5.30E-04
								Total (Lungs) HQ =					1.71E-04

Only Provisional Toxicity Criteria Available

(1) Only Provisional Toxicity Criteria Available
NAV = Information Not Available
N/A = Not Applicable
NC = Non-Carcinogenic

000773

TABLE L-9-5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPOS
REASONABLE MAXIMUM EXPOSURE
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario: Unrefined; Future Potential
Receptor Population: Resident Summer
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Contact with Groundwater	1,1-Dichloroethane	NC	NC	NC	NC	1,1-Dichloroethane	Lungs	2.05E-07	3.84E-12	4.30E-07	7.21E-07
			1,2-Dichloroethane	NC	NC	NC	NC	1,2-Dichloroethane	Liver	1.86E-04	3.32E-09	3.22E-04	5.07E-04
			Benzene (1)	7.23E-11	8.21E-16	1.46E-09	1.53E-09	Benzene (1)	NAV	5.11E-06	1.59E-10	1.03E-04	1.08E-04
			Carbon Disulfide	NC	NC	NC	NC	Carbon Disulfide	Fetal Toxicity	8.55E-07	8.59E-12	3.10E-06	3.96E-08
			Chloroform (1)	9.88E-11	2.35E-14	1.89E-10	2.66E-10	Chloroform (1)	Liver	1.88E-05	3.94E-09	3.20E-05	5.09E-05
			Chloromethane (1)	1.71E-11	1.24E-16	9.97E-12	2.71E-11	Chloromethane (1)	Kidney	N/A	2.68E-12	N/A	2.68E-12
			Methylene Chloride	3.87E-11	1.54E-16	2.87E-11	8.74E-11	Methylene Chloride	Liver	1.00E-06	1.35E-12	7.43E-07	1.75E-06
			PCE (1)	2.48E-10	1.58E-16	2.89E-09	3.14E-09	PCE (1)	Liver	5.59E-06	8.35E-12	6.48E-05	7.04E-05
			Toluene	NC	NC	NC	NC	Toluene	Liver/Kidney	3.55E-07	1.89E-11	2.77E-05	3.16E-05
			PCE (1)	9.82E-11	9.17E-16	3.14E-10	4.12E-10	PCE (1)	NAV	N/A	2.57E-10	N/A	2.97E-10
			Total Risk Across Groundwater				5.44E-09				Total Hazard Index Across Groundwater and All Exposure Routes		
Total Risk Across Groundwater and All Exposure Routes				5.44E-09									

Total [Liver] HI =	6.33E-04
Total [Kidney] HI =	3.16E-08
Total [Lungs] HI =	7.21E-07

(1) Only Provisional Toxicity Criteria Available
NAV = Information Not Available

(1) Only Provisional Toxicity Criteria Available
NAV = Information Not Available
N/A = Not Applicable
NC = Non-Carcinogenic

Total [Liver] HI = 6.32E-04
Total [Kidney] HI = 3.16E-05
Total [Lungs] HI = 7.21E-07

000774

TABLE L-9-6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario: Unrefined Fuel Gas Potential Hydrocarbon
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Contact with Groundwater	1,1,1-Trichloroethane	NC	NC	NC	NC	1,1,1-Trichloroethane	NAV	7.34E-04	5.06E-04	8.36E-05	1.25E-03
			1,1-Dichloroethane	NC	NC	NC	NC	1,1-Dichloroethane	Lungs	2.45E-05	1.75E-04	1.21E-07	1.59E-04
			1,2-Dichloroethane (total)	NC	NC	NC	NC	1,2-Dichloroethane (total)	Liver	4.81E-04	4.31E-09	2.41E-05	4.74E-03
			2-Butanone	NC	NC	NC	NC	2-Butanone	Depressed Fetal Birth Weight	2.45E-03	5.06E-02	1.48E-05	5.31E-02
			Acetone	NC	NC	NC	NC	Acetone	Liver/Kidney	3.82E-03	3.82E-02	1.16E-06	4.20E-02
			Benzene (1)	3.46E-08	1.70E-07	3.33E-10	2.05E-07	Benzene (1)	NAV	5.87E-04	1.04E-02	5.85E-05	1.10E-02
			Carbon disulfide	NC	NC	NC	NC	Carbon disulfide	Fetal Toxicity	8.02E-05	4.04E-04	9.40E-07	4.82E-04
			Methylene chloride	2.62E-08	5.77E-08	6.27E-11	8.33E-08	Methylene chloride	Liver	1.63E-04	1.14E-04	3.90E-07	2.77E-04
			Tetrachloroethene (1)	6.54E-07	2.52E-07	2.45E-09	9.30E-07	Tetrachloroethene (1)	Liver	3.52E-03	3.20E-03	1.32E-04	8.86E-03
			Toluene	NC	NC	NC	NC	Toluene	Liver/Kidney	4.11E-05	7.21E-04	9.32E-07	7.63E-04
			Trichloroethene (1)	1.08E-08	5.87E-08	1.11E-10	6.95E-08	Trichloroethene (1)	NAV	N/A	4.57E-03	N/A	4.57E-03
				Total Risk Across Groundwater and All Exposure Routes					Total Hazard Index Across Groundwater and All Exposure Routes				
				1.29E-09					1.25E-01				
				1.29E-09									

(1) Only Provisional Toxicity Criteria Available
NAV = Information Not Available
N/A = Not Applicable
NC = Non-Carcinogenic

Total [Liver] HI = 5.46E-02
Total [Kidney] HI = 4.27E-02
Total [Lungs] HI = 1.99E-04

000775

Table N-7
Summary of Child Swimmer Hazards and Risks
Hypothetical Future Off-Site Residential Exposure to Groundwater
Using Current Concentrations in On-Site H-Well Cluster
 Alcoa-Davenport Works

SUMMARY OF NONCANCER HAZARDS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	<0.0001	<0.0001	<0.0001	<0.0001
1,2-dichloroethane	NA	0.0175	0.0304	0.0479
methylene chloride	<0.0001	0.0003	0.0002	0.0004
PCE	<0.0001	0.0578	0.6700	0.7278
vinyl chloride	<0.0001	0.0012	0.0013	0.0025
TCE	<0.0001	NA	NA	<0.0001
TOTAL	<0.0001	0.0768	0.7018	0.7786

SUMMARY OF THEORETICAL EXCESS LIFETIME CANCER RISKS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	NC	NC	NC	NA
1,2-dichloroethane	NC	NC	NC	NA
methylene chloride	4.E-14	1.E-08	7.E-09	2.E-08
PCE	2.E-12	3.E-06	3.E-05	3.E-05
vinyl chloride	2.E-13	5.E-07	5.E-07	1.E-06
TCE	8.E-13	9.E-08	3.E-07	4.E-07
TOTAL	3.E-12	3.E-06	3.E-05	3.E-05

Based on provisional toxicity criteria

NC= Non-carcinogenic constituent

NA= Not applicable

Table N-8
Summary of Adult Gardener Hazards and Risks
Hypothetical Future Off-Site Residential Exposure to Groundwater
Using Current Concentrations in On-Site H-Well Cluster
 Alcoa-Davenport Works

SUMMARY OF NONCANCER HAZARDS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	<0.0001	<0.0001	<0.0001	<0.0001
1,2-dichloroethene	NA	0.0195	0.0047	0.0321
methylene chloride	<0.0001	0.0003	<0.0001	0.0003
PCE	0.0024	0.0644	0.1077	0.1744
vinyl chloride	<0.0001	0.0013	0.0002	0.0016
TCE	0.0068	NA	NA	0.0068
TOTAL	0.0092	0.0856	0.1125	0.2073

SUMMARY OF THEORETICAL EXCESS LIFETIME CANCER RISKS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	NC	NC	NC	NA
1,2-dichloroethene	NC	NC	NC	NA
methylene chloride	5.E-09	5.E-08	6.E-09	7.E-08
PCE	2.E-07	1.E-05	2.E-05	4.E-05
vinyl chloride	1.E-08	1.E-06	2.E-07	1.E-06
TCE	1.E-07	5.E-07	2.E-07	8.E-07
TOTAL	3.E-07	2.E-05	2.E-05	4.E-05

Based on provisional toxicity criteria

NC= Non-carcinogenic constituent

NA= Not applicable

000777

Table N-9
Summary of Adult Car Washer Hazards and Risks
Hypothetical Future Off-Site Residential Exposure to Groundwater
Using Current Concentrations in On-Site H-Well Cluster
 Alcoa-Davenport Works

SUMMARY OF NONCANCER HAZARDS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	<0.0001	<0.0001	<0.0001	<0.0001
1,2-dichloroethane	NA	0.0135	0.0046	0.0181
methylene chloride	<0.0001	0.0002	<0.0001	0.0002
PCE	0.0016	0.0446	0.1054	0.1516
vinyl chloride	<0.0001	0.0009	0.0002	0.0011
TCE	0.0047	NA	NA	0.0047
TOTAL	0.0064	0.0592	0.1102	0.1758

SUMMARY OF THEORETICAL EXCESS LIFETIME CANCER RISKS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	NC	NC	NC	NA
1,2-dichloroethane	NC	NC	NC	NA
methylene chloride	3.E-09	4.E-08	5.E-09	5.E-08
PCE	2.E-07	1.E-05	2.E-05	3.E-05
vinyl chloride	8.E-09	9.E-07	2.E-07	1.E-06
TCE	7.E-08	3.E-07	2.E-07	6.E-07
TOTAL	2.E-07	1.E-05	2.E-05	4.E-05

Based on provisional toxicity criteria

NC= Non-carcinogenic constituent

NA= Not applicable

Table N-10
Summary of Adult Potable Water User Hazards and Risks
Hypothetical Future Off-Site Residential Exposure to Groundwater
Using Current Concentrations in On-Site H-Well Cluster
 Alcoa-Davenport Works

SUMMARY OF NONCANCER HAZARDS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	0.0006	0.0004	0.000017	0.0010
1,2-dichloroethene	NA	4.26	0.203	4.47
methylene chloride	0.00847	0.0622	0.001247	0.0719
PCE	2.4990	14.055	4.6886	21.243
vinyl chloride	0.0592	0.29311	0.00792	0.3602
TCE	7.161	NA	NA	7.161
TOTAL	9.7	18.67	4.901	33.3

SUMMARY OF THEORETICAL EXCESS LIFETIME CANCER RISKS

Constituent	Inhalation of Volatiles	Ingestion	Dermal	TOTAL
1,1-dichloroethane	NC	NC	NC	NA
1,2-dichloroethene	NC	NC	NC	NA
methylene chloride	5.E-06	1.E-05	2.E-07	2.E-05
PCE	2.E-04	3.E-03	1.E-03	4.E-03
vinyl chloride	1.E-05	3.E-04	8.E-06	3.E-04
TCE	1.E-04	1.E-04	1.E-05	2.E-04
TOTAL	4.E-04	4.E-03	1.E-03	5.E-03

Based on provisional toxicity criteria

NC= Non-carcinogenic constituent

NA= Not applicable

000779

TABLE 2-1
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN
IN WETLAND 2

CONSTITUENT	STATUS
<i>Volatile Organic Compounds (VOCs)</i>	
Carbon disulfide	Uncertainty
<i>Semivolatile Organic Compounds (SVOCs)</i>	
Carbazole	COPEC
Dibenzofuran	COPEC
Phenol	Uncertainty
4-Methylphenol	Uncertainty
<u><i>PAHs</i></u>	
Acenaphthene	COPEC
Anthracene	COPEC
Fluorene	COPEC
Naphthalene	COPEC
Phenanthrene	COPEC
Fluoranthene	COPEC
Pyrene	COPEC
Benzo(a)anthracene	COPEC
Benzo(a)pyrene	COPEC
Benzo(b)fluoranthene	COPEC
Benzo(g,h,i)perylene	COPEC
Benzo(k)fluoranthene	COPEC
Chrysene	COPEC
Dibenzo(a,h)anthracene	COPEC
Indeno(1,2,3-cd)pyrene	COPEC
<i>Polychlorinated Biphenyls (PCBs)</i>	
Aroclor 1248	COPEC
Aroclor 1254	COPEC
<i>Inorganics</i>	
Chromium (Cr)	COPEC
Copper (Cu)	COPEC
Manganese (Mn)	COPEC
Zinc (Zn)	COPEC

COPEC - Chemical of Potential Ecological Concern

Uncertainty - These constituents were not detected in Wetland 2 sediments, but sample quantitation limits exceeded screening benchmarks in greater than 20% of samples.

TABLE 2-2
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE SOIL
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/kg)	Range of SQL ^a (mg/kg)	Background ^d	Screening Benchmark (mg/kg)	COPEC?	Rationale
<i>Volatile Organic Compounds</i>							
1,1,1-Trichloroethane	0/24	ND	0.011-13		4887	N	A
1,1,2,2-Tetrachloroethane	0/18	ND	0.011-13		6.2	N	C (11)
1,1-Dichloroethane	0/24	ND	0.011-13		118	N	A
1,1-Dichloroethene	0/24	ND	0.011-13		4.3	N	C (8)
1,2-Dichloroethane	0/24	ND	0.011-13		63	N	A
1,2-Dichloroethene	1/24	0.046	0.011-13		108	N	A
Methyl ethyl ketone/2-Butanone	0/24	ND	0.011-13		729	N	A
2-Hexanone	0/24	ND	0.011-13		2.9	N	C (8)
4-Methyl-2-Pentanone (hexanone) ^c	0/24	ND	0.011-13		2.9	N	C (8)
Acetone	2/24	0.015	0.011-13		21	N	A
Benzene	0/42	ND	0.011-13		79	N	A
Bromodichloromethane	0/24	ND	0.011-13		5.1	N	C (8)
Bromoform	0/24	ND	0.011-13		163	N	A
Bromomethane	0/24	ND	0.011-13		2.2	N	C (8)
Carbon disulfide	0/24	ND	0.011-13		55	N	A
Chlorobenzene	0/24	ND	0.011-13		967	N	A
Chloroethane	0/24	ND	0.011-13		1890	N	A
Chloroform	0/24	ND	0.011-13		19	N	A
Chloromethane	0/24	ND	0.011-13		39	N	A
Dibromochloromethane	0/24	ND	0.011-13		108	N	A
Ethylbenzene	0/42	ND	0.011-13		1905	N	A
Methylene chloride	0/24	ND	0.011-13		8.9	N	C (8)
Tetrachloroethene	3/24	0.120	0.011-13		141	N	A
Toluene	1/42	0.006	0.011-13		178	N	A
Total Xylenes	0/42	ND	0.011-13		25	N	A
Trichloroethene	0/24	ND	0.011-13		3030	N	A
Vinyl chloride	0/24	ND	0.011-13		0.36	N	C (8)
trans-1,3-dichloropropene	0/18	ND	0.011-13		123	N	A
<i>Semivolatile Organic Compounds</i>							
2,4,6-Trichlorophenol	0/12	ND	0.37-6.1		167	N	A
2,4-Dimethylphenol	0/12	ND	0.37-6.1		201	N	A
2-Methylnaphthalene	1/12	1.2	0.37-6.1		599	N	A
3,3'-Dichlorobenzidine	0/12	ND	0.37-6.1		97	N	A
4-Methylphenol	0/12	ND	0.37-6.1		195	N	A
Acenaphthene	0/12	ND	0.37-6.1		5702	N	A
Acenaphthylene ^d	0/12	ND	0.37-6.1		5702	N	A
Anthracene	2/12	0.96	0.37-6.1		25415	N	A
Benzo(a)anthracene ^a	7/12	3.2	0.38-6.1		5.6	N	C (8)
Benzo(a)pyrene	7/12	2.2	0.38-6.1		5.6	N	C (8)
Benzo(b)fluoranthene ^a	7/12	3.7	0.38-6.1		5.6	N	C (8)
Benzo(g,h,i)perylene ^a	2/12	0.94	0.37-6.1		5.6	N	C (8)
Benzo(k)fluoranthene ^a	4/12	1.2	0.38-6.1		5.6	N	C (8)

TABLE 2-2
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE SOIL
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/kg)	Range of SQL ^c (mg/kg)	Background ^d	Screening Benchmark (mg/kg)	COPEC?	Rationale
Butyl benzyl phthalate	0/12	ND	0.37-6.1		5343	N	A
Carbazole	0/12	ND	0.37-6.1		170	N	A
Chrysene ^a	7/12	3.2	0.38-6.1		5.6	N	C(8)
Dibenz(a,h)anthracene ^a	0/12	ND	0.37-6.1		5.6	N	C(8)
Dibenzofuran	0/12	ND	0.37-6.1		207	N	A
Fluoranthene	10/12	11	0.38-0.41		1834	N	A
Fluorene	0/12	ND	0.37-6.1		3588	N	A
Indeno(1,2,3-cd)pyrene ^a	5/12	1.6	0.38-6.1		5.6	N	C(8)
Naphthalene	0/12	ND	0.37-6.1		2224	N	A
Phenanthrene	6/12	4.6	0.38-6.1		346	N	A
Phenol	0/12	ND	0.37-6.1		123	N	A
Pyrene	9/12	6.5	0.38-0.41		1100	N	A
bis(2-ethylhexyl)phthalate	0/12	ND	0.37-6.1		27	N	A
di-n-butylphthalate	0/12	ND	0.37-6.1		4304	N	A
di-n-octylphthalate	0/12	ND	0.37-6.1		668	N	A
PCBs							
Aroclor-1016	0/34	ND	0.019-19		152	N	A
Aroclor-1221 ^b	0/34	ND	0.019-19		60	N	A
Aroclor-1232 ^b	0/34	ND	0.019-19		60	N	A
Aroclor-1242	0/34	ND	0.019-19		60	N	A
Aroclor-1248	29/34	320	0.04-0.3		0.27	Y	B
Aroclor-1254	15/34	8.0	0.038-39		0.41	Y	B
Aroclor-1260	0/34	ND	0.038-39		66	N	A
Inorganic Compounds							
Aluminum	11/11	15800	--	47000	17579	N	A
Arsenic	9/11	5.3	2.2-2.4	5.2	75	N	A
Barium	10/11	425	45.4	440	1218	N	E
Beryllium	0/11	ND	0.22-1.8	No data	76	N	A
Cadmium	0/11	ND	0.90-1.4	No data	0.21	U	D (100)
Chromium	11/11	28.6	--	37	12.2	N	E
Cobalt	1/11	16.1	0.000-12.8	6.7	18.9	N	A
Copper	10/11	208	5.8	17	63	Y	B
Cyanide	1/11	0.66	0.55-0.91	No data	10	N	A
Lead	11/11	117	--	16	4.0	Y	B
Manganese	11/11	1420	--	330	7402	N	A
Mercury	5/17	1.6	0.11-0.19	.058	2.5	N	A
Nickel	9/11	28.1	9.1-9.2	13	443	N	A
Selenium	0/2	ND	0.74-2.5	.26	3.0	N	A
Silver	1/11	2.3	0.000-18.3	ND	18.2	N	A
Thallium	0/11	ND	0.000-18.3	No data	4.6	N	C(9)
Vanadium	10/11	42.5	11.4	58	NA	N	E
Zinc	10/11	720	79.2	48	76	Y	B

TABLE 2-2
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE SOIL
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/kg)	Range of SQL ^a (mg/kg)	Background ^d	Screening Benchmark (mg/kg)	COPEC?	Rationale
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Summaries are based on surface water from Outfalls 001 to 006.

Duplicate samples were only counted once. The maximum of the two duplicate values was used.

^a benzo(a)pyrene used as a surrogate

^b Aroclor 1242 used as a surrogate

^c Range of SQLs only included for nondetects

^d from NOAA SQUIRT Tables (Buchman 1999).

^e Acenaphthene used as a surrogate

^f 2-hexanone used as a surrogate

A - Maximum concentration detected, or one-half maximum SQL did not exceed screening benchmark

B - Maximum concentration detected exceeded screening benchmark

C - One-half SQL exceeded SC in less than 20% of samples. Constituent not detected above SC.

Number of samples in which one-half SQL exceed of SC is presented in parentheses.

D - Uncertainty. Constituent not detected above SC, but 1/2 SQL exceeded SC in greater than 20% of samples.

Number of samples in which one-half SQL exceed of SC is presented in parentheses.

E - Maximum concentration does not exceed background

Bold Type indicates constituent is selected as a COPEC or uncertainty

000783

TABLE 2-3
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE SEDIMENTS
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/kg)	Background (mg/kg)	Range of SQL ^a (mg/kg)	Screening Benchmark (mg/kg)	COPEC?	Rationale
Volatile Organic Compounds							
1,1,1-Trichloroethane	4/37	0.03		0.011-2.8	565	N	A
1,1,2,2-Tetrachloroethane	0/37	ND		0.011-2.8	0.34	N	C (3)
1,1-Dichloroethane	4/37	0.008j		0.011-2.8	45	N	A
1,1-Dichloroethene	0/37	ND		0.011-2.8	0.44	N	C (3)
1,2-Dichloroethane	0/37	ND		0.011-2.8	37	N	A
1,2-Dichloroethene	6/37	0.13		0.011-2.8	38	N	A
Methyl ethyl ketone/2-Butanone	14/37	0.22		0.011-2.8	2098	N	A
2-Hexanone	0/37	ND		0.011-2.8	1.8	N	C (3)
4-Methyl-2-Pentanone (hexanone) ^f	0/37	ND		0.011-2.8	1.8	N	C (3)
Acetone	17/37	15		0.011-0.022	118	N	A
Benzene	1/37	0.061		0.011-2.8	12.0	N	A
Bromodichloromethane	0/37	ND		0.011-2.8	0.90	N	C (3)
Bromoform	0/37	ND		0.011-2.8	20	N	A
Bromomethane	0/37	ND		0.011-2.8	1.9	N	C (3)
Carbon disulfide	6/37	0.021		0.011-2.8	12	N	A
Chlorobenzene	0/37	ND		0.011-2.8	83	N	A
Chloroethane	0/37	ND		0.011-2.8	1066	N	A
Chloroform	0/37	ND		0.011-2.8	4.4	N	A
Chloromethane	4/37	0.270		0.011-2.8	50	N	A
Dibromochloromethane	0/37	ND		0.011-2.8	25	N	A
Ethylbenzene	0/37	ND		0.011-2.8	3.4	N	A
Methylene chloride	4/37	0.630		0.013-2.8	7	N	A
Tetrachloroethene	6/37	0.086		0.011-2.8	3.2	N	A
Toluene	5/37	5.9		0.011-0.069	19	N	A
Total Xylenes	2/37	0.027j		0.011-2.8	1.5	N	A
Trichloroethene	6/37	0.025		0.011-2.8	355.40	N	C (3)
Vinyl chloride	1/37	0.035		0.011-2.8	0.20	N	C (3)
trans-1,3-dichloropropene	0/37	ND		0.011-2.8	36	N	A
Semivolatile Organic Compounds							
1,4,6-Trichlorophenol	0/55	ND		0.4-280	5.0	U	D (23)
2,4-Dimethylphenol	1/55	0.14j		0.4-280	22	N	C (13)
2-Methylnaphthalene	1/55	0.33j		0.4-280	12	N	C (16)
3,3'-Dichlorobenzidine	0/55	ND		0.43-280	3.7	U	D (47)
4-Methylphenol	3/55	4.6j		0.4-280	32	N	C (4)
Acenaphthene	41/55	30		0.4-46	154	N	A
Acenaphthylene ^d	0/55	ND		0.4-280	154	N	C (2)
Anthracene	48/55	67j		0.4-7.8	2452	N	A
Benzo(a)anthracene ^e	51/55	200j		0.4-0.51	2.5	Y	B
Benzo(a)pyrene	50/55	160		0.4-0.51	2.5	Y	B
Benzo(b)fluoranthene ^a	52/55	250		0.4-0.51	2.5	Y	B
Benzo(g,h,i)perylene ^a	40/55	130		0.4-44	2.5	Y	B
Benzo(k)fluoranthene ^a	52/55	93j		0.4-0.51	2.5	Y	B

TABLE 2-3
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE SEDIMENTS
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/kg)	Background (mg/kg)	Range of SQL ^c (mg/kg)	Screening Benchmark (mg/kg)	COPEC?	Rationale
Butyl benzyl phthalate	3/55	2.2		0.43-280	188	N	A
Carbazole	46/55	67j		0.44-46	5	Y	B
Chrysene ^a	52/55	250		--	2.5	Y	B
Dibenz(a,h)anthracene ^a	31/55	32		0.44-46	2.5	Y	B
Dibenzofuran	29/55	19		0.43-46	7.1	Y	B
Fluoranthene	52/55	590		--	91	Y	B
Fluorene	38/55	31		0.43-46	197	N	A
Indeno(1,2,3-cd)pyrene ^a	40/55	100		0.44-44	2.5	Y	B
Naphthalene	13/55	12		0.43-280	129	N	A
Phenanthrene	52/55	420		--	17	Y	B
Phenol	7/55	6.2j		0.44-280	11	U	D (21)
Pyrene	52/55	520		--	184	Y	B
bis(2-ethylhexyl)phthalate	21/55	17j		0.43-280	12	Y	B
di-n-butylphthalate	2/55	1.2		0.43-280	148	N	C (4)
di-n-octylphthalate	1/55	26j		0.43-280	581	N	A
PCBs							
Aroclor-1016	0/37	ND		0.033-0.82	0.79	U	D (41)
Aroclor-1221 ^b	0/37	ND		0.067-1.7	0.242	U	D (57)
Aroclor-1232 ^b	0/37	ND		0.033-0.82	0.242	U	D (46)
Aroclor-1242	0/37	ND		0.033-0.82	0.242	U	D (46)
Aroclor-1248	35/37	77		0.056-0.48	0.075	Y	B
Aroclor-1254	35/37	10		0.043-0.044	0.039	Y	B
Aroclor-1260	0/37	ND		0.033-0.82	4.6	N	A
Inorganic Compounds							
Aluminum	37/37	52300	14865 ^a	--	17579	Y	B
Arsenic	37/37	9.0	1.1 ^b	--	227	N	A
Barium	37/37	209	0.7 ^b	--	3990	N	A
Beryllium	35/37	2.5	no data	0.52-0.87	83	N	A
Cadmium	20/37	2.2	0.1-0.3 ^b	0.62-1.04	125	N	A
Chromium	37/37	92.8	24 ^b	--	100	N	A
Cobalt	37/37	10.9B	10 ^b	--	50	N	A
Copper	37/37	2150	20 ^b	--	854	N	see text
Cyanide	5/37	2.4	No data	0.01-1.4	100	N	A
Lead	37/37	5520j	18.7 ^a	--	100	Y	B
Manganese	37/37	962j	983 ^a	--	11000	N	A
Mercury	9/37	4.5	0.001-0.051 ^b	0.09-0.24	40	N	A
Nickel	37/37	35.9	9.9 ^b	--	5000	N	A
Selenium	5/37	1.1Bj	0.29 ^b	0.42j-1.4j	50	N	A
Silver	8/37	3.2	<0.5 ^b	1.0-2.7	84	N	A
Thallium	7/37	0.63B	No data	0.21-0.88	9.6	N	A
Vanadium	37/37	38.0	50 ^b	--	68	N	A
Zinc	37/37	418	80 ^b	--	2280	N	A

TABLE 2-3
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE SEDIMENTS
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/kg)	Background (mg/kg)	Range of SQL ^c (mg/kg)	Screening Benchmark (mg/kg)	COPEC?	Rationale
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Summaries are based on surface sediments samples from Outfalls 001 to 006 from Phase 1 (1991) and include semivolatiles from 1998. Duplicate samples were only counted once. The maximum of the two duplicate values was used.

^a benzo(a)pyrene used as a surrogate

^b Aroclor 1242 used as a surrogate

^c Range of SQLs only included for nondetects

^d Acenaphthene used as a surrogate

^e 2-hexanone used as a surrogate

^f based on background inorganic concentrations in sediments from Mississippi River Pool 15 (WCIA 1998).

^h based on background inorganic concentrations reported in NOAA Screening Tables (Buchman 1999)

A - Maximum concentration detected, or one-half maximum SQL, did not exceed screening benchmark

B - Maximum concentration detected exceeded screening benchmark

C - One-half SQL exceeded SC in less than 20% of samples. Constituent not detected above SC.

Number of samples in which one-half SQL exceed of SC is presented in parentheses.

D - Uncertainty. Constituent not detected above SC, but 1/2 SQL exceeded SC in greater than 20% of samples.

Number of samples in which one-half SQL exceed of SC is presented in parentheses.

E - Maximum concentration does not exceed background

F - Fe, Ca, Na, K, and Mg are essential nutrients, they are physiologically regulated, and have low toxicity.

TABLE 2-4
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE WATER
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/L)	Range of SQL ^c (mg/L)	Screening Benchmark (mg/L)	COPEC?	Rationale
<i>Volatile Organics Compounds</i>						
1,1,1-Trichloroethane	1/16	0.0019	0.001-0.5	183	N	A
1,1,2,2-Tetrachloroethane	0/16	ND	0.001-0.5	0.077	N	C (5)
1,1-Dichloroethane	1/16	1	0.001-0.5	36	N	A
1,1-Dichloroethene	0/16	ND	0.001-0.5	0.315	N	C (5)
1,2-Dichloroethane	0/16	ND	0.001-0.5	50	N	A
1,2-Dichloroethene	8/16	7.4	0.001-0.0071	30	N	A
Methyl ethyl ketone/2-Butanone	0/16	ND	0.01-1.0	7292	N	A
2-Hexanone	0/16	ND	0.01-1.0	3	N	A
4-Methyl-2-Pentanone (hexanone) ^c	1/16	0.0096	0.01-1.0	3	N	A
Acetone	1/16	0.190	0.01-1.0	412	N	A
Benzene	0/16	ND	0.001-0.5	8.5	N	A
Bromodichloromethane	1/16	0.058	0.001-0.5	0.63	N	A
Bromoform	4/16	0.130	0.001-0.5	8.8	N	A
Bromomethane	1/16	0.0067	0.002-1.0	3.8	N	A
Carbon disulfide	1/16	0.0075	0.001-0.5	11	N	A
Chlorobenzene	0/16	ND	0.001-0.5	11.4	N	A
Chloroethane	1/16	0.0027	0.002-1.0	1212	N	A
Chloroform	2/16	0.035	0.001-0.5	3.9	N	A
Chloromethane	1/16	0.017	0.002-1.0	126	N	A
Dibromochloromethane	2/16	0.074	0.001-0.5	9.5	N	A
Ethylbenzene	0/16	ND	0.001-0.5	0.25	N	C (5)
Methylene chloride	14/16	0.44 B	0.001-0.001	11	N	A
Tetrachloroethene	11/16	2.2	0.001-0.0071	0.69	Y	B
Toluene	0/16	ND	0.001-0.5	3.5	N	A
Total Xylenes	0/16	ND	0.001-0.5	0.10	N	C (6)
Trichloroethene	8/16	2.0	0.001-0.0071	68	N	A
Vinyl chloride	6/16	1.6	0.002-0.014	0.25	Y	B
trans-1,3-dichloropropene	0/16	ND	0.01-0.33	28	N	A
<i>Semivolatile Organic Compounds</i>						
2,4,6-Trichlorophenol ^a	3/20	0.006j	0.01-0.02	0.24	N	A
2,4-Dimethylphenol ^a	0/20	ND	0.01-0.02	9.2	N	A
2-Methylnaphthalene ^a	0/20	ND	0.01-0.02	0.4	N	A
3,3'-Dichlorobenzidine ^a	0/20	ND	0.01-0.02	0.13	N	A
4-Methylphenol ^a	0/20	ND	0.01-0.02	27	N	A
Acenaphthene	0/16	ND	0.001-0.005	2.0	N	A
Acenaphthylene ^d	1/16	0.0022L	0.001-0.005	2.0	N	A
Anthracene	0/16	ND	0.002-0.010	23.8	N	A
Benzo(a)anthracene ^a	3/16	0.00025L	0.0001-0.0005	0.0006	N	A
Benzo(a)pyrene	5/16	0.00036L	0.0001-0.0005	0.0006	N	A
Benzo(b)fluoranthene ^a	4/16	0.00031L	0.0001-0.0005	0.0006	N	A
Benzo(g,h,i)perylene ^a	3/16	0.0002	0.0001-0.0005	0.0006	N	A
Benzo(k)fluoranthene ^a	5/16	0.00015L	0.00005-0.00025	0.0006	N	A

TABLE 2-4
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE WATER
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/L)	Range of SQL ^c (mg/L)	Screening Benchmark (mg/L)	COPEC?	Rationale
Butyl benzyl phthalate*	1/20	0.0009j	0.01-0.02	2.2	N	A
Carbazole*	0/20	ND	0.01-0.02	0.2	N	A
Chrysene*	3/16	0.00024	0.0001-0.0005	0.0006	N	A
Dibenz(a,h)anthracene*	4/16	0.00022	0.0001-0.0005	0.0006	N	A
Dibenzofuran*	0/20	ND	0.01-0.02	0.09	N	A
Fluoranthene	6/16	0.0006L	0.0001-0.0005	0.26	N	A
Fluorene	0/16	ND	0.001-0.005	1.29	N	A
Indeno(1,2,3-cd)pyrene*	6/16	0.00027L	0.0001-0.0005	0.0006	N	A
Naphthalene	0/16	ND	0.002-0.010	5.8	N	A
Phenanthrene	0/16	ND	0.001-0.005	0.03	N	A
Phenol*	1/20	0.002j	0.01-0.02	9.4	N	A
Pyrene	6/16	0.00041	0.0001-0.0005	0.16	N	A
bis(2-ethylhexyl)phthalate*	1/20	0.001j	0.01-0.02	0.18	N	A
di-n-butylphthalate*	1/20	0.0005j	0.01-0.02	0.48	N	A
di-n-octylphthalate*	0/20	ND	0.01-0.02	0.018	N	C (5)
PCBs						
Aroclor-1016	0/16	ND	0.0005-0.0025	0.0003	N	C (6)
Aroclor-1221 ^b	0/16	ND	0.0005-0.0025	0.00012	U	D (100)
Aroclor-1232 ^b	0/16	ND	0.0005-0.0025	0.00012	U	D (100)
Aroclor-1242	0/16	ND	0.0005-0.0025	0.00012	U	D (100)
Aroclor-1248	0/16	ND	0.0005-0.0025	0.000005	U	D (100)
Aroclor-1254	0/16	ND	0.0005-0.0025	0.000001	U	D (100)
Aroclor-1260	0/16	ND	0.0005-0.0025	0.0002	U	D (100)
Inorganic Compounds						
Aluminum	9/16	0.702	0.2-0.2	12.7	N	A
Arsenic	1/16	0.0039	0.01-0.01	4.3	N	A
Barium	16/16	0.120 B	NA	2.6	N	A
Beryllium	0/16	ND	0.005-0.005	0.085	N	A
Cadmium	0/16	ND	0.005-0.005	0.017	N	A
Chromium	0/16	ND	0.01-0.01	2.8	N	A
Cobalt	0/16	ND	0.05-0.05	1.5	N	A
Copper	8/16	0.02 B	0.025-0.025	0.18	N	A
Cyanide	5/20	0.0129	0.005	3.78	N	A
Lead	0/16	ND	0.003	0.003	N	A
Manganese	16/16	0.688	NA	14.7	N	A
Mercury	0/16	ND	0.0002-0.0002	0.0001	N	A
Nickel	3/16	0.029	0.04-0.04	13.6	N	A
Selenium	2/16	0.0049	0.005-0.005	0.2184	N	A
Silver	0/16	ND	0.01-0.01	0.36	N	A
Thallium	0/16	ND	0.01-0.01	0.014	N	A
Vanadium	0/16	ND	0.05-0.05	0.067	N	A
Zinc	16/16	0.144	NA	0.33	N	A

TABLE 2-4
CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SURFACE WATER
Alcoa Davenport Works, Riverdale, Iowa

Analyte	Frequency of Detection	Maximum Concentration (mg/L)	Range of SQL ^a (mg/L)	Screening Benchmark (mg/L)	COPEC?	Rationale
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Summaries are based on surface water from Outfalls 001 to 006.

Duplicate samples were only counted once. The maximum of the two duplicate values was used.

* Based on Phase I data collected in 1991. All others are based on 1998 data.

^b benzo(a)pyrene used as a surrogate

^b Aroclor 1242 used as a surrogate

^c Range of SQLs only included for nondetects

^d Acenaphthene used as a surrogate

^e 2-hexanone used as a surrogate

A - Maximum concentration detected, or one-half maximum SQL did not exceed screening benchmark

B - Maximum concentration detected exceeded screening benchmark

C - One-half SQL exceeded SC in less than 20% of samples. Constituent not detected above SC.

Number of samples in which one-half SQL exceed of SC is presented in parentheses.

D - Uncertainty. Constituent not detected above SC, but 1/2 SQL exceeded SC in greater than 20% of samples.

Number of samples in which one-half SQL exceed of SC is presented in parentheses.

Bold Type indicates constituent is selected as a COPEC or uncertainty

TABLE 2-7
SUMMARY OF CANDIDATE RECEPTORS AND FORAGE AREAS
Alcoa Davenport Works, Davenport, Iowa

Exposure Area	Candidate Receptors			
	Eastern Historical Disposal Area and Western Disposal Area	Light Bulb Disposal Area and Dredge Disposal Area	Outfalls 001 - 006	Outfall 001 Pond
				Wetland 2
Risk Hypothesis				
TERRESTRIAL FSA UNITS				
1.) Are the concentrations of PCBs in soil sufficient to impair the reproduction of terrestrial carnivorous birds and mammals that may forage in the upland sections of the FSA units and consume animals containing PCBs?	Little Brown Bat Red Fox American Kestrel Red-tailed Hawk	Little Brown Bat Red Fox Red-tailed Hawk		
2.) Are the concentrations of lead in soil and small mammals sufficient to impair the reproduction of terrestrial carnivorous mammals that may forage in the upland sections of the FSA units?	Little Brown Bat Red Fox			
3.) Are the concentrations of copper and zinc in small mammals sufficient to impair the reproduction of terrestrial carnivorous mammals and birds that may forage in the upland sections of the FSA units?	Little Brown Bat Red Fox American Kestrel Red-tailed Hawk			
OUTFALLS				
4.) Are concentrations of PCBs in outfall sediments, invertebrates, and animals sufficient to impair the survival, growth, or reproduction of semiaquatic carnivorous birds that may forage in the outfalls?			Great Blue Heron Mallard Little Brown Bat	Mallard Little Brown Bat
5.) Are concentrations of carbazole, dibenzofuran, phenanthrene and high molecular weight PAHs in outfall sediments and invertebrates sufficient to impair the reproduction and development of semiaquatic omnivorous or primary carnivore birds and mammals?			Little Brown Bat Raccoon ^a Mallard	Little Brown Bat Mallard

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TABLE 2-7
SUMMARY OF CANDIDATE RECEPTORS AND FORAGE AREAS
 Alcoa Davenport Works, Davenport, Iowa

Exposure Area	Eastern Historical Disposal Area and Western Disposal Area	Light Bulb Disposal Area and Dredge Disposal Area	Outfalls 001 - 006	Outfall 001 Pond	Wetland 2
Candidate Receptors					
Risk Hypothesis					
6.) Are concentrations of vinyl chloride and tetrachloroethene in outfall surface water sufficient to impair the growth or survival of semiaquatic omnivorous or primary carnivorous mammals that may forage in the outfalls and consume animals and water?			Little Brown Bat ^a Raccoon ^b		
7.) Are concentrations of bis(2-ethylhexyl)phthalate in the outfall sediments sufficient to impair the growth or survival of semiaquatic omnivorous or primary carnivorous mammals that may forage in the outfalls and consume animals and sediment?			Little Brown Bat Raccoon ^a	Little Brown Bat	
8.) Are the concentrations of lead sufficient to impair the reproduction of semiaquatic omnivorous or carnivorous birds that may forage in the Outfall 001 pond and consume invertebrates containing lead.				Little Brown Bat Mallard	
9.) Are concentrations of aluminum in outfall sediments and invertebrates sufficient to impair the reproduction and development of semiaquatic omnivorous or primary carnivore birds and mammals?			Little Brown Bat Raccoon ^a Mallard		
WETLAND 2					
10.) Are the concentrations of PCBs in soils/sediments, invertebrates and animals sufficient to impair the reproduction of semiaquatic carnivorous birds that may forage in Wetland 2?					Great Blue Heron Mallard
11.) Are concentrations of carbazole, dibenzofuran, LMW PAHs and HAW PAHs in soils/sediments sufficient to impair the survival, growth or reproduction birds and mammals in Wetland 2?					Mallard Raccoon Little Brown Bat Red Fox American Kestrel

Shaded areas indicate the risk hypotheses are not applicable.

^a Applicable only to Outfalls 001 to 005.

^b Applicable only to Outfalls 001 and 002.

000791

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
MRP 15 SURFACE WATER ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Shoreline adjacent to ALCOA (MRP15)

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency			
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Rationale
PCBs (total)	ug/L	NA ¹	NA	NA	NA		2.0E-05	NA	max concentration	2.0E-05	NA	max concentration	2.0E-05	max concentration
Aroclor 1248	ug/L	NA ²	NA	NA	NA		2.0E-05	NA	max concentration	2.0E-05	NA	max concentration	2.0E-05	max concentration
Aroclor 1254	ug/L	NA ²	NA	NA	NA		2.0E-05	NA	max concentration	2.0E-05	NA	max concentration	2.0E-05	max concentration
Aroclor 1260	ug/L	NA ²	NA	NA	NA		2.0E-05	NA	max concentration	2.0E-05	NA	max concentration	2.0E-05	max concentration

¹ Not Applicable. PCBs have not been detected in MRP15 adjacent to Alcoa shoreline using standard analytical methods. One sample collected immediately downstream from Outfall 006 was submitted for congener-specific PCB analysis which results in substantially lower detection limits. The total PCB concentration in the sample using a congener-specific approach was 0.02 parts per trillion.

² The same exposure point concentration was used for individual Aroclors because congener specific analysis shows the Aroclor detected having characteristics of both Aroclor 1248 and 1260.

000792

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
WETLANDS 1 AND 2 SURFACE WATER ALCOA-DAVENPORT WORKS, RIVERDALE IOWA

Scenario Timeframe: Current												
Medium: Surface Water												
Exposure Medium: Surface Water												
Exposure Point: Wetlands 1 and 2												
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration ¹	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
PCBs (total)	ug/L	0.5	NA	5.60E+00	NA	ug/L	0.5	NA	max Aroclor EPC 1/2 detection limit value	0.5	NA	max Aroclor EPC 1/2 detection limit value
Aroclor 1248	ug/L	0.25	NA	ND	NA	ug/L	0.25	NA	1/2 detection limit value	0.25	NA	1/2 detection limit value
Aroclor 1254	ug/L	0.5	NA	ND	NA	ug/L	0.5	NA	1/2 detection limit value	0.5	NA	1/2 detection limit value
Aroclor 1260	ug/L	0.5	NA	4.80E+00	NA	ug/L	0.5	NA	1/2 detection limit value	0.5	NA	1/2 detection limit value
Benzo(a)pyrene	ug/L	0.05	NA	ND	NA	ug/L	0.05	NA	1/2 detection limit value	0.05	NA	1/2 detection limit value

NA: Not Available.
¹ Because aroclors 1248 and 1254 were not detected, one-half the detection limit was used to calculate the total PCB concentration.

000793

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
MRP 15 SEDIMENT ALCOA-DAYENPORT WORKS, RIVERDALE IOWA

Scenario Titleframe: Current Medium: Sediments Exposure Medium: MRP 15 Sediments Exposure Point: Shoreline adjacent to ALCOA (MRP 15)														
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency			
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale		
PCBs (total)	mg/kg	0.278	NA	3.5	NA	mg/kg	0.65	W-Test -3	95% UCL	0.278	NA	arithmetic mean		
Aroclor 1248	mg/kg	0.238	NA	3.5	NA	mg/kg	0.59	W-Test -3	95% UCL	0.238	NA	arithmetic mean		
Aroclor 1254	mg/kg	0.086	NA	0.680	NA	mg/kg	0.23	W-Test -3	95% UCL	0.086	NA	arithmetic mean		
Aroclor 1260	mg/kg	0.087	NA	0.099	NA	mg/kg	0.21	W-Test -3	95% UCL	0.087	NA	arithmetic mean		

NA: Not Available.
W-Test: Developed by Shapiro and Wilk.
(1) Normal Data
(2) Log-transformed Data
(3) Nonparametric Jackknife-transformed Data

000794

TABLE 3.4
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
WETLAND SEDIMENT ALCOA-DAVENPORT WORKS, RIVERDALE IOWA

Scenario Timeframe: Current Medium: Sediments Exposure Medium: Wetland Sediments Exposure Point: Wetlands No. 1 and No. 2														
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency			
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale		
PCBs (total)	mg/kg	7.86	NA	25.25	NA	mg/kg	10.72	W-Test -3	95% UCL	7.86	NA	antithetic mean		antithetic mean
Aroclor 1248	mg/kg	3.43	NA	18.0	NA	mg/kg	5.04	W-Test -3	95% UCL	3.43	NA	antithetic mean		antithetic mean
Aroclor 1254	mg/kg	4.08	NA	18.0	NA	mg/kg	5.65	W-Test -3	95% UCL	4.08	NA	antithetic mean		antithetic mean
Aroclor 1260	mg/kg	0.349	NA	ND	NA	mg/kg	0.55	W-Test -3	95% UCL	0.349	NA	antithetic mean		antithetic mean
Benzofluoranthene	mg/kg	10.4	NA	180	NA	mg/kg	28.75	W-Test -4	95% UCL	10.4	NA	antithetic mean		antithetic mean

NA: Not Available.
W-Test: Developed by Shapiro and Wilk
(1) Normal Data
(2) Log-transformed Data
(3) Nonparametric Jackknife-transformed Data

000795

5/12/00

TABLE 3.5
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (BOAT)
RECREATIONAL FISHERMAN INGESTION OF FISH TISSUE ALCOA-DAVENPORT WORKS, RIVERDALE IOWA

Scenario Timeframe: Current													
Medium: Sediment/Surface Water													
Exposure Medium: Fish Tissue													
Exposure Point: Contaminant Concentration in Fish (Boat)													
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	
PCBs (total)	mg/kg	0.169	NA	3.7	NA		0.212	NA ¹	95% UCL	0.169	NA ¹	arithmetic mean	
Aroclor 1248	mg/kg	0.037	NA	0.53	NA		0.052	NA ¹	95% UCL	0.037	NA ¹	arithmetic mean	
Aroclor 1254	mg/kg	0.096	NA	2.9	NA		0.124	NA ¹	95% UCL	0.096	NA ¹	arithmetic mean	
Aroclor 1260	mg/kg	0.035	NA	0.28	NA		0.044	NA ¹	95% UCL	0.035	NA ¹	arithmetic mean	

NA: Not Applicable

¹ Calculated as the weighted sum of individual fish comprising overall intake. See Section 3 and Appendix B for additional analytical discussion.

000796

5/15/00

TABLE 3.0
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (SHORE)
RECREATIONAL FISHERMAN INGESTION OF FISH TISSUE ALCOA-DAVENPORT WORKS, RIVERDALE IOWA

Scenario Timeframe: Current
Medium: Sediment/Surface Water
Exposure Medium: Fish Tissue
Exposure Point: Contaminant Concentration in Fish (Shore)

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency			
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Rationale
PCBs (total)	mg/kg	0.163	NA	3.7	NA		0.223	NA ¹	95% UCL	0.163	NA ¹	arithmetic mean		
Aroclor 1248	mg/kg	0.038	NA	0.53	NA		0.058	NA ¹	95% UCL	0.038	NA ¹	arithmetic mean		
Aroclor 1254	mg/kg	0.092	NA	2.9	NA		0.124	NA ¹	95% UCL	0.092	NA ¹	arithmetic mean		
Aroclor 1260	mg/kg	0.035	NA	0.28	NA		0.069	NA ¹	95% UCL	0.035	NA ¹	arithmetic mean		

NA: Not Applicable

¹ Calculated as weighted sum of individual fish comprising overall intake. See Section 3 and Appendix B for additional analytical discussion.

000797

5/15/00

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
MISSISSIPPI RIVER POOL 15, ALCOA-DAVENPORT WORKS, RIVERDALE IOWA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Sediment	Sediment	Shoreline adjacent to ALCOA (Areas 1A, 1B, 1C, 1D)	Recreational Boat Fisherman	Adult	Dermal	Off-Site	Quant	Boat fishermen could wade in shallow water and contact sediments.
				Duck Hunter	Adult	Dermal	Off-Site	Qual	The duck hunter could wade in shallow water to reach his duck blind and contact sediments.
				Trespasser	Adult	Dermal	On-Site	Quant	Trespasser could enter site and walk through wetlands and come in contact with sediments.
	Surface Water/ Sediment	Animal Tissue	Shoreline adjacent to ALCOA (Areas 1A, 1B, 1C, 1D) Duck Creek (Area 1D)	Recreational Boat Fisherman	Adult	Fish Ingestion	Off-Site	Quant	Recreational fishermen who eat the fish they catch.
				Recreational Shoreline Fisherman	Adult	Fish Ingestion	Off-Site	Quant	Recreational fishermen who eat the fish they catch.
				Recreational Fisherman	Adult	Dermal	Off-Site	Quant	Boat fishermen could wade in shallow water.
	Surface Water	Surface Water	Shoreline adjacent to ALCOA (Areas 1A, 1B, 1C, 1D)	Duck Hunter	Adult	Dermal	Off-Site	Qual	The duck hunter could wade in shallow water to reach his duck blind and contact surface water.
				Trespasser	Adult	Dermal	On-Site	Quant	Trespasser could enter site and walk through wetlands and come in contact with surface water in the wetlands.
					Adult	Dermal	On-Site	Quant	

000798

5/12/00

TABLE 6.1
CANCER TOXICITY DATA — ORAL/DERMAL
MRP 15 ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor(1)	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source Target Organ	Date (2) (MM/DD/YY)
Total PCBs	2.00E+00	NA	2.00E+00	kg-day/mg	B2	IRIS	8/27/98
Benzo(a)pyrene	7.30E+00	0.85 (3)	8.60E+00	kg-day/mg	B2	IRIS	11/12/98

IRIS = Integrated Risk Information System

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and

inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

(1) Slope factor divided by adjustment factor.

No adjustment made for PCBs

(2) Date IRIS was searched.

(3) ATSDR 1991

5/15/00

000799

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
MRP15 ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD Target Organ (3) (MMDDYY)
Aroclor - 1248	Chronic	7.00E-05	mg/kg/day	NA	NA	mg/kg/day	skin female reproduction, rhesus monkey study		IRIS	8/27/98
Aroclor - 1254	Chronic	2.00E-05	mg/kg/day	NA	NA	mg/kg/day	Ocular exudate, inflamed and prominent Meibomian glands, distorted growth of finger and toe nails, decreased antibody IgG and IgM response to sheep erythrocytes, Monkey Clinical and Immunologic Studies	UF = 300 MF = 1	IRIS IRIS IRIS	8/27/98 8/27/98 8/27/98
Aroclor - 1260	Chronic	7.00E-05	mg/kg/day	NA	NA	mg/kg/day	liver tumors in rats		IRIS	8/27/97

N/A = Not Applicable

(1) No adjustment made

(2) No adjustment made

(3) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

For NCEA values, provide the date of the article provided by NCEA.

000000

5/15/00

TABLE 9.2 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CORPS
REASONABLE MAXIMUM EXPOSURE
MISSISSIPPI RIVER POOL 15, ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Transmittal: Current
Receptor Population: Recreational Boat Fisherman
Receptor Age: Adult

Receptor Age: Adult																
Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk*				Chemical	Non-Carcinogenic Hazard Quotient							
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total			
Sediment Surface Water Surface Water	Sediment Surface Water Fish Tissue	Shoreline Adjacent to MRP 15	Total PCBs	NA	NA	1.3E-08	1.3E-08	Total PCBs	NA	NA	7.5E-04	7.5E-04				
				NA	NA	6.2E-13	6.2E-13						NA	NA	1.7E-07	1.7E-07
				4.2E-05	NA	NA	4.2E-05						2.2E+00	NA	NA	2.2E+00
				Total Risk Across (Medium)				Total Hazard Index Across All Media and All Exposure Routes				2.2E+00				
				4.2E-03												
				4.2E-05												

NA: Not Applicable

*Carcinogenic risk was calculated using total PCBs.

Total (Organ) HQ =
Total (Organ) HQ =
Total (Organ) HQ =

000801

9/13/2004

TABLE B-4 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MISSISSIPPI RIVER POOL 15, ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeline: Current
Receptor Population: Recreational Stonehenge Fisherman
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk*				Chemical	Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal
Surface Water	Fish Tissue	Dark Creek	Total PCBs	4.7E-05	NA	NA	4.7E-05	Total PCBs		2.90E+00	NA	NA
				Total Risk Across All Media and All Exposure Routes				Total Hazard Index Across All Media and All Exposure Routes				
				4.7E-05				2.5E+00				

NA: Not Applicable

*Carcinogenic risk was calculated using total PCBs.

Total [Organic] HI =
Total [Organic] HI =
Total [Organic] HI =

000802

TABLE 9.6 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CORCS
REASONABLE MAXIMUM EXPOSURE
MISSISSIPPI RIVER POOL 15, ALCOA-DAVENPORT WORKS, RIVERDALE, IOWA

Scenario Timeframe: Current
Receptor Population: Shoreline Trespasser
Receptor Age: Adult

Receptor Age: Adult													
Media	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk*				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment Surface Water Sediment Surface Water	Sediment Surface Water Sediment Surface Water	Wetlands 1 and 2 Wetland 1	Total PCBs Benz(a)pyrene	NA	NA	2.2E-07	2.2E-07	Total PCBs Benz(a)pyrene	NA	NA	1.2E-02	1.2E-02	
				NA	NA	8.6E-08	8.6E-08		-	NA	NA	2.7E-02	2.7E-02
				NA	NA	1.2E-06	1.2E-06		NA	NA	NA	NA	NA
				NA	NA	3.1E-08	3.1E-08		NA	NA	NA	NA	NA
				Total Risk Across [Medium]				Total Hazard Index Across All Media and All Exposure Routes				3.9E-02	
				1.5E-06									
				1.5E-06									
Total Risk Across All Media and All Exposure Routes													

NA: Not Applicable

*Carcinogenic risk was calculated using total PCBs.

Total [Organ] HI =

Total [Organ] HI =

Total [Organ] HI =

000803

9/13/2004

Table 2-2

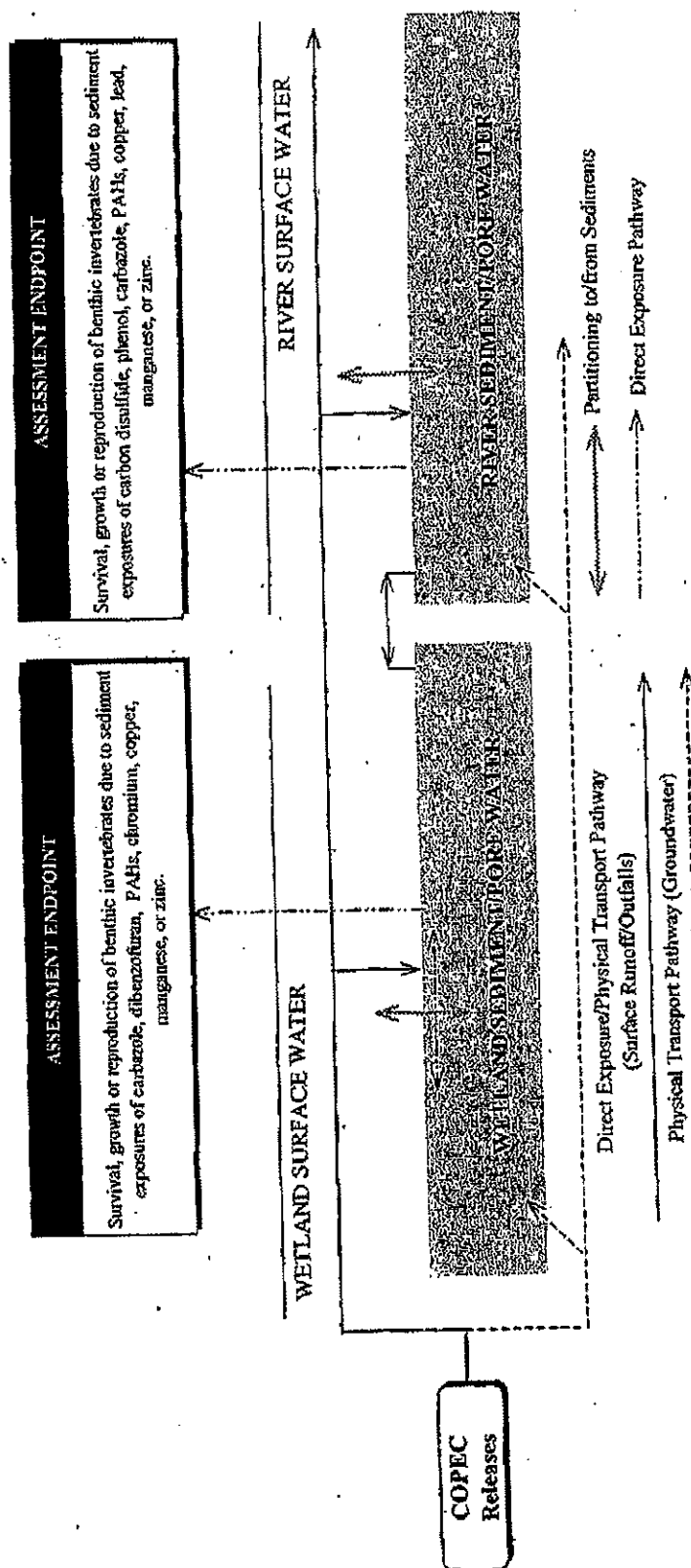
Physical/Chemical Properties of COPECs
MRP15 and Wetland 1

Mackay Level 1 Fugacity Based Partitioning														
COPEC	CAS#	Molecular Weight (g/mol)	Specific Gravity g/cc	Water Solubility (mg/L@25°C)	Vapor Pressure (mm Hg @25°C)	Henry's Law Constant (@25°C)	Log ₁₀ K _{ow}	Log ₁₀ K _{oc}	Air	Soil	Water	Sediment	Suspended Sediment	Aquatic Biota
POCs														
Carbon disulfide	75-15-0	76.13	1.26	2.20E+05	356	NA	NA	NA						
SVOCs														
Carbazole	86-74-8	167	1.1	0.721	2.66E-04	8.13E-05	3.29	3.26	65.28%	6.10%	72.92%	5.69%	0.01%	0.00%
Dibenzofuran	132-64-9	168	1.09	10	3.40E-05	7.45E-07	4.12 - 4.31	3.91 - 4.11	28.07%	24.22%	25.07%	22.61%	0.04%	0.01%
Phenol	108-95-2	94.11	1.06	6.39E+03	5.30E-01	1.03E-05	1.47	2.14	26.37%	0.17%	73.30%	0.16%	0.00%	0.00%
PAHs														
Acenaphthene	83-32-9	154	1.02	3.47 - 3.93	1.60E-03	7.92E-05	3.92 - 4.33	3.66	29.10%	23.56%	25.30%	21.99%	0.04%	0.01%
Anthracene	120-12-7	178	1.24	0.030 - 0.1125	1.7E-05 - 1.95E-04	6.51E-05	4.34 - 4.54	4.2 - 4.42	77.55%	9.58%	3.91%	8.94%	0.01%	0.01%
Fluorene	86-73-7	166	1.2	1.65 - 1.98	1.0E-03 - 1.0E-2	2.10E-04	4.12 - 4.38	3.70	23.16%	28.60%	21.49%	26.69%	0.04%	0.02%
Naphthalene	91-20-3	128	1.16	30 - 34	2.3E-01 - 8.7E-01	4.60E-04	3.2 - 4.7	2.74 - 3.50	96.11%	0.48%	2.96%	0.45%	0.00%	0.00%
Phenanthrene	85-01-8	178	1.18	0.71 - 1.29	6.80E-04	2.54E-05	4.2 - 4.6	3.72 - 4.59	0.15%	42.60%	17.39%	39.76%	0.07%	0.03%
Fluoranthene	206-44-0	202	1.25	0.206-0.373	5.00E-06	1.69E-02	5.22	4.62	0.25%	48.03%	6.80%	44.82%	0.07%	0.03%
Pyrene	129-00-0	202	1.27	0.013 - 0.171	6.85E-07 - 2.5E-06	1.10E-05	4.88 - 5.32	4.66 - 5.13	0.00%	48.14%	6.82%	44.93%	0.07%	0.03%
Benzo(a)anthracene	56-55-3	228	1.27	0.0094 - 0.014	1.17E-07	8.00E-06	5.61 - 5.91	6.15	0.09%	50.95%	1.39%	47.55%	0.08%	0.03%
Benzo(a)pyrene	205-99-2	252	1.35	0.0032	5.00E-07	1.20E-05	6.37	5.74	0.09%	51.41%	0.49%	47.99%	0.08%	0.03%
Benzo(b)fluoranthene	191-24-2	276	1.35	0.00026	1.00E-10	1.40E-07	7.1	6.89	0.00%	51.58%	0.17%	48.14%	0.08%	0.03%
Benzo(g,h,i)perylene	207-08-9	252	1.35	0.00055	9.60E-11	1.04E-03	6.85	6.64	0.07%	51.41%	0.49%	47.98%	0.08%	0.03%
Benzo(k)fluoranthene	218-01-9	278	1.27	0.0018 - 0.006	6.30E-09	3.15E-07	5.60 - 5.91	5.38	0.08%	50.95%	1.39%	47.55%	0.08%	0.03%
Chrysene	53-70-3	278	1.28	0.00240 - 0.005	3.41E-14	7.33E-09	5.97 - 6.30	6.23	0.09%	51.62%	0.07%	48.18%	0.08%	0.03%
Dibenz(a,h)anthracene	193-35-5	276	1.35	0.062	1.00E-09	2.96E-20	5.91 - 7.70	7.49	0.09%	51.58%	0.17%	48.14%	0.08%	0.03%
PCBs														
Aroclor 1248	12672-29-6	288	1.41	0.06	4.90E-04	3.50E-03	6.11	5.64	1.56%	52.86%	3.27%	42.29%	0.05%	0.01%
Aroclor 1254	11097-89-1	327	1.5	0.012 - 0.057	7.70E-05	2.30E-03	5.61 - 6.47	5.61	0.67%	53.21%	3.48%	42.57%	0.05%	0.02%
Aroclor 1260	11096-82-5	370	1.57	0.08	4.10E-05	7.10E-03	6.91	6.42	0.02%	55.20%	0.56%	44.16%	0.06%	0.01%
COPEC														
	CAS #	Atomic Weight g/mol	Atomic Radius (angstroms)	Atomic Volume	Ionic Radius 2+ (angstroms)	Ionic Radius 3+ (angstroms)	Density g/cc	Ionization Potential (eV) 2+	Ionization Potential (eV) 3+	pK ₁	pK ₂	pK ₃	pK ₄	K _d
Chromium (Cr)	7440-47-3	52.0	1.17	7.3	0.64	0.55	7.1	6.76	6.05	8.2	9.3	10.3	11.3	22
Copper (Cu)	7440-50-8	63.54	1.17	7.1	0.96	0.87	8.9	7.72	—	9.7	11.1	10.2	15.0	NA
Iron (Fe)	7439-89-6	55.847	1.16	7.1	0.83	0.84	7.9	7.9	16.16	7.9	9.4	10.7	—	2.80E+05
Lead (Pb)	7439-92-1	207.19	1.54	18.27	1.32	0.84	11.34	7.41	14.96	10.8	11.6	12.4	13.1	NA
Manganese (Mn)	7439-96-5	54.938	1.17	7.4	0.91	0.62	7.4	7.43	15.46	9.2	7.9	11.3	12.3	40
Zinc (Zn)	7440-66-6	65.37	1.25	9.2	0.74	0.74	7.3	9.39	17.89	9.2	7.9	11.3	12.3	40

NA: Not available for this chemical

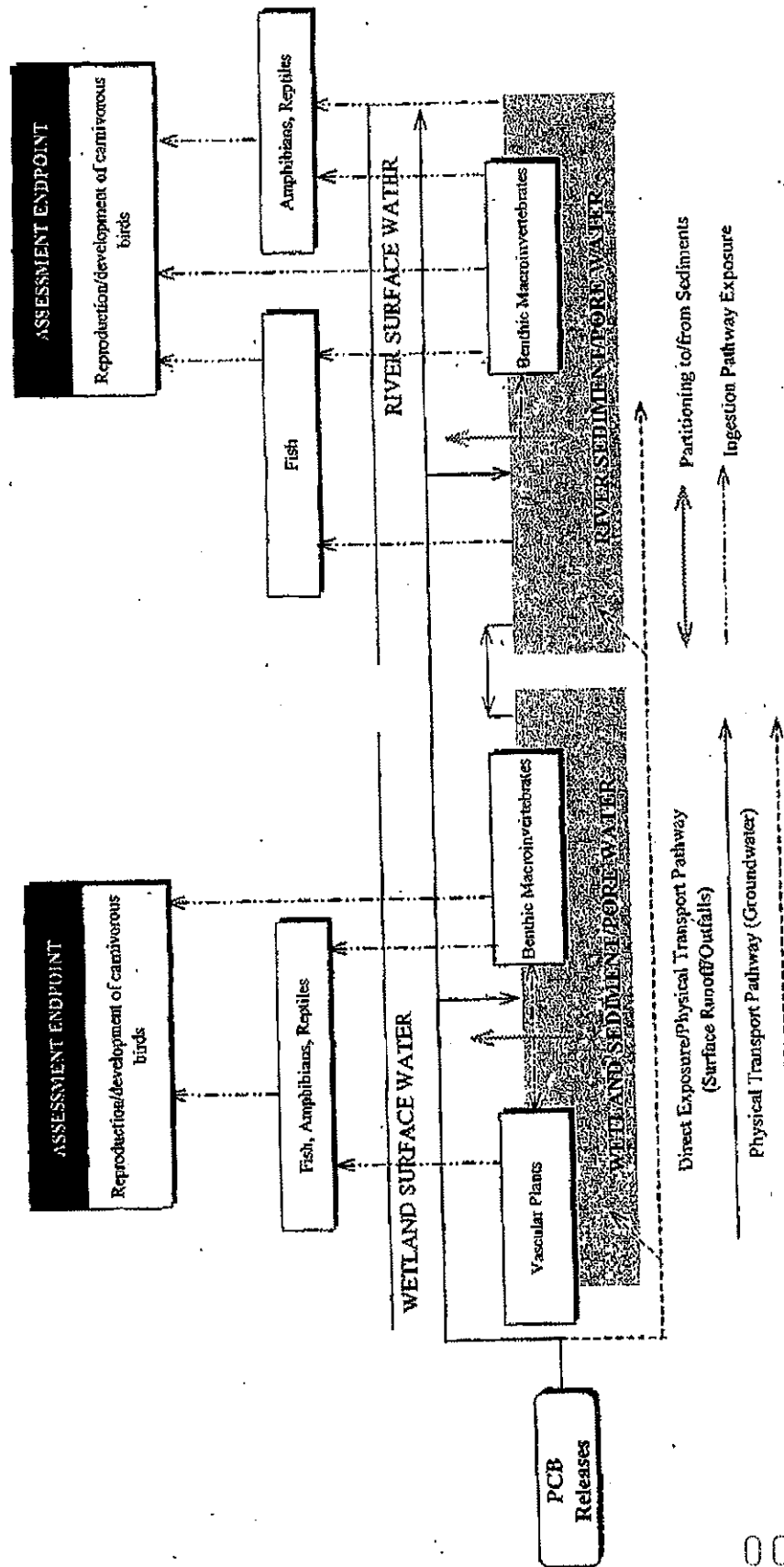
1 = Level 1 Fugacity based on the methods prescribed by Mackay and Paterson (1981) following the assumptions used by USEPA Assessment Tools for the Assessment of Risks (ASTER Database). Data were obtained from the Aroclor CSMA (G&M 1995), Assessment Tools for Evaluation of Risk Database (ASTER), RTI (1995), Hazardous Substance Data Bank (HSDB), USEPA (1979), Haslop & Robinson (1963), Inorganic Chemistry, Elsevier Publ. NY.

FIGURE 2-9
CONCEPTUAL MODEL FOR DIRECT EXPOSURE PATHWAYS TO COPECS
 Alcoa-Davenport Works, Riverdale, Iowa



000805

FIGURE 2-10
CONCEPTUAL MODEL FOR INGESTION PATHWAY EXPOSURES TO PCBs
 Alcoa-Davenport Works, Riverdale, Iowa



000806

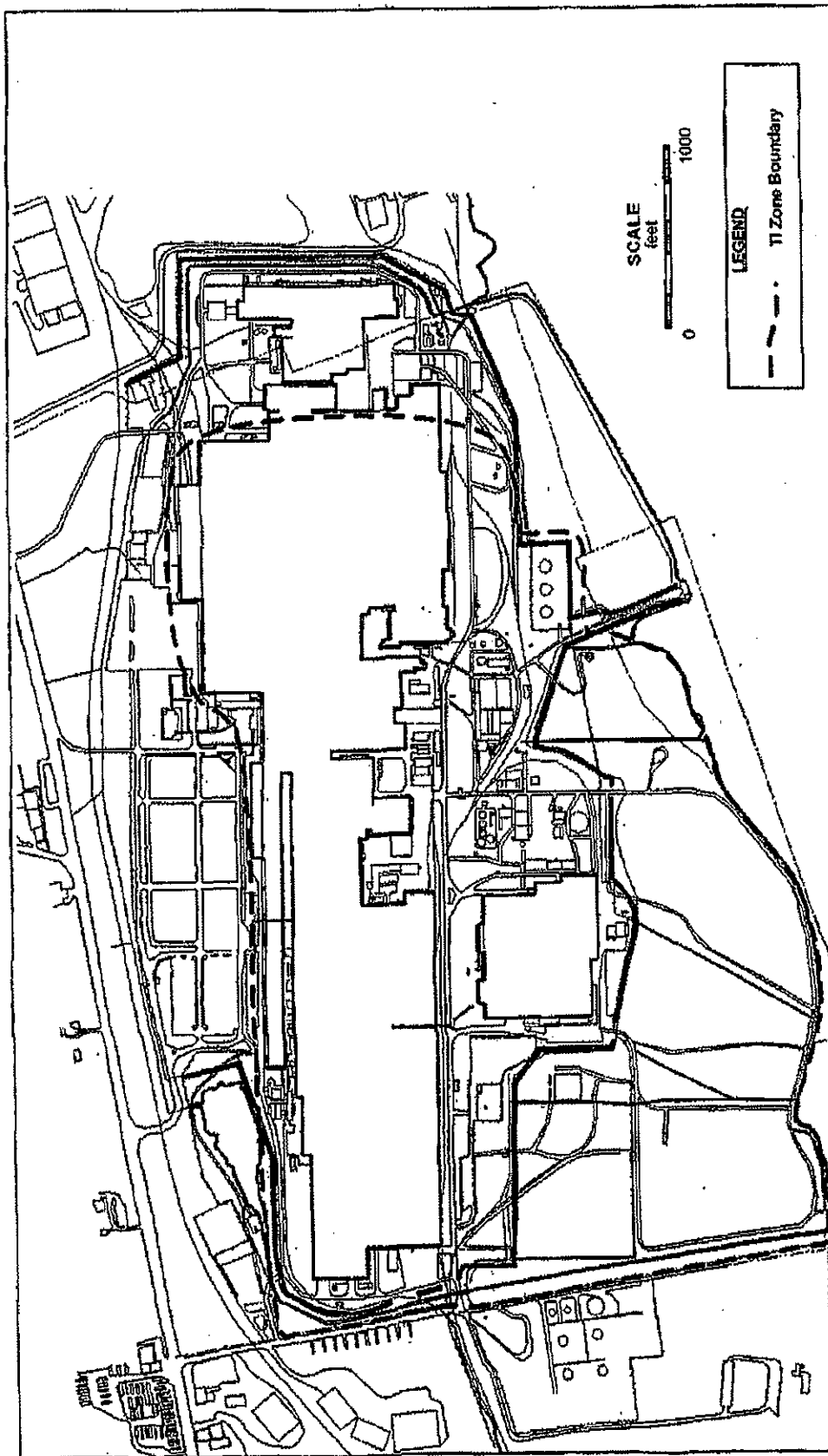


Figure 3
TI Zone Boundary
Alcoa-Davenport Works, Riverdale, Iowa

*Adapted from Figure 6-1 of the Technical Impracticability Evaluation Report for Groundwater Restoration (Appendix A to the Alcoa-Davenport Works Groundwater Feasibility Study Report, ENSR, May 2004)

000807

TABLE 4-4
FFS COST ESTIMATE
ALTERNATIVES IIa & IIb
GROUNDWATER EXTRACTION AND TREATMENT
ALCOA DAVENPORT WORKS
RIVERDALE, IOWA
Jul-2003

ALTERNATIVE IIa					
DIRECT CAPITAL COSTS					
Item No.	Component	Quantity	Unit	Unit Price	Cost
1	Air Stripper Installation ^(1a)				
	Site Preparation	1	LS	\$ 25,000	\$ 25,000
	Air Stripper Equipment	1	LS	\$ 200,000	\$ 200,000
2	Upgrade Existing Wells ^(2a)	3	EA	\$ 12,500	\$ 37,500
3	Groundwater Discharge (Existing System) ^(3a)	0	N/A	\$ -	\$ -
INDIRECT CAPITAL COSTS					
4	Air Stripper O&M ^(4a)	1	30 Yrs	\$ 1,172,600	\$1,172,600
5	NPDES Monitoring ^(5a)	1	30 Yrs	\$ 56,000	\$ 56,000
6	Groundwater Monitoring ^(6a)	1	30 Yrs	\$ 675,000	\$ 675,000
7	Institutional Controls ^(7a)				
	Deed Restrictions	1	LS	\$ 10,000	\$ 10,000
	Site Security	1	30 Yrs	\$ 2,251,000	\$2,251,000
	Maintenance of Fencing and Signage	1	30 Yrs	\$ 56,000	\$ 56,000
8	Engineering/Permitting Services ^(8a)	1	LS	\$ 50,000	\$ 50,000
Total Alternative IIa					\$4,583,100

ALTERNATIVE IIb					
DIRECT CAPITAL COSTS					
Item No.	Component	Quantity	Unit	Unit Price	Cost
1	Air Stripper Installation ^(1b)				
	Site Preparation	1	LS	\$ 25,000	\$ 25,000
	Air Stripper Equipment	1	LS	\$ 200,000	\$ 200,000
2	Upgrade Existing Wells ^(2b)	3	EA	\$ 12,500	\$ 37,500
3	Groundwater Discharge (Recycle/Reuse) ^(3b)				

	Piping and Pumping System	1	LS	\$ 15,000	\$ 15,000
	Sand Filter	1	LS	\$ 40,000	\$ 40,000
INDIRECT CAPITAL COSTS					
4	Air Stripper O&M ^(4b)	1	30 Yrs	\$ 1,172,600	\$1,172,600
5	Sand Filter O&M ^(6b)	1	30 Yrs	\$ 275,000	\$ 275,000
6	NPDES Monitoring ^(6b)	1	30 Yrs	\$ 56,000	\$ 56,000
7	Groundwater Monitoring ^(7b)	1	30 Yrs	\$ 675,000	\$ 675,000
8	Institutional Controls ^(8b)				
	Deed Restrictions	1	LS	\$ 10,000	\$ 10,000
	Site Security	1	30 Yrs	\$ 2,251,000	\$2,251,000
	Maintenance of Fencing and Signage	1	30 Yrs	\$ 56,000	\$ 56,000
9	Engineering/Permitting Services ^(9b)	1	LS	\$ 60,000	\$ 60,000
Total Alternative II					\$4,073,100

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**FOOTNOTES
TABLE 4-4
FFS COST ESTIMATE
ALTERNATIVES IIa & IIb
GROUNDWATER EXTRACTION AND TREATMENT
ALCOA DAVENPORT WORKS
RIVERDALE, IOWA
JULY 2003**

- 1a. Budgetary cost estimate provided by SAIC.
 - 2a. Budgetary cost estimate provided by SAIC.
 - 3a. Assume no additional costs associated with utilizing the existing treatment system discharge.
 - 4a. Budgetary yearly cost estimate (\$104,161/year) provided by SAIC. Assume a net present worth value based on an eight- percent rate of return.
 - 5a. Based on actual annual accrued costs (approximately \$5,000/year) for current NPDES sampling and analysis program. Assume a net present worth value based on an eight- percent rate of return.
 - 6a. Based on actual annual costs (approximately \$60,000/year) accrued for current well network sampling and analysis program. Assume a net present worth value based on an eight- percent rate of return.
 - 7a. Deed restriction cost estimate based on assumed attorney's fees and drawing preparation for the establishment of deed restrictions. Site security estimate based on approximate annual costs (\$200,000) accrued for guard service considered related to on-going remedial activities. Site security costs related to overall site operations significantly higher. Assume a net present worth value based on an eight- percent rate of return.
 - 8a. Assumed cost based on approximately 20 percent of the direct capital costs.
-
- 1b. Budgetary cost estimate provided by SAIC.
 - 2b. Budgetary cost estimate provided by SAIC.
 - 3b. Piping/pumping cost based on assumed budgetary lump sum to route the groundwater discharge water to a location in the mill. Actual costs may vary significantly based on the actual location of final reuse. Assume that a sand filter will be utilized for supplemental treatment of the air stripper effluent prior to recycle/reuse. Budgetary capital cost estimate for the sand filter provided by Hoffland Environmental Inc.
 - 4b. Budgetary yearly cost estimate (\$104,161/year) provided by SAIC. Assume a net present worth value based on an eight- percent rate of return.

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5b. Based on the following assumed annual costs:

- Replacement sand filter media – assume \$1,500;
- Annual power – assume \$2,000;
- O&M Labor – assume \$20,000; and,
- Miscellaneous equipment/replacement parts - \$1,000.

Assume a net present worth value based on an eight- percent rate of return. Assume no discharge monitoring required.

6b. Based on actual annual costs (approximately \$5,000/year) accrued for current NPDES sampling and analysis program. Assume a net present worth value based on an eight- percent rate of return.

7b. Based on actual annual costs (approximately \$60,000/year) accrued for current well network sampling and analysis program. Assume a net present worth value based on an eight- percent rate of return.

8b. Deed restriction cost estimate based on assumed attorney's fees and drawing preparation for the establishment of deed restrictions. Site security based on approximate annual costs (\$200,000/year) accrued for guard service. Assume a net present worth value based on an eight- percent rate of return.

9b. Assumed cost based on approximately 20 percent of the direct capital costs.

TABLE 3-1
POTENTIAL FEDERAL AND STATE LOCATION-SPECIFIC ARARS, ALCOA-DAVENPORT WORKS SITE, RIVERDALE, IOWA
(ADDRESSED AS PART OF FSA UNIT EVALUATION PROGRAM)

Location	Requirement	Prerequisite	Citation FEDERAL	ARAR Determination	Comments
Executive Order 11988, Floodplain Management; and Fish and Wildlife Coordination Act, 16 U.S.C. 661 et seq.					
Within floodplain	Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values	Action that will occur in a floodplain; i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 CFR 6, Appendix A, and 40 CFR 6.302(f)	Applicable To be addressed as part of FSA Unit Evaluation Program	The Alcoa site is located on a floodplain terrace. Therefore, remedial actions must meet the requirements of this Executive Order.
Executive Order 11990, Protection of Wetlands					
Wetlands	Action to avoid adverse effects, minimize potential harm, and preserve and enhance wetlands, to the extent possible	Action involving construction of facilities or management of property in wetlands, as defined by 40 CFR Part 6, Appendix A, section 4(f)	Executive Order 11990 Section 7(c); 40 CFR Part 6, Appendix A; 40 CFR 6.302	Applicable To be addressed as part of FSA Unit Evaluation Program	There are two wetlands on the Alcoa site. Remedial actions must be in compliance with the requirements of this Executive Order.
Clean Water Act, 33 U.S.C. 1251 et seq.					
Wetlands	Action to prohibit discharge of dredged or fill material into wetland without a permit	Wetlands, as defined by Executive Order 11990, Section 7	CWA Section 404; 40 CFR Part 230; and 33 - 330	Applicable To be addressed as part of FSA Unit Evaluation Program	There are two wetlands on the Alcoa site. Remedial actions must be in compliance with these requirements.
Historic Sites, Buildings, and Antiquities Act, 16 U.S.C. 461 et seq. National Archeological and Historical Preservation Act, 16 U.S.C. Section 469					
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts	Action to recover and preserve artifacts	Alterations of terrain that threatens significant scientific, prehistoric, data.	36 CFR Part 65	Applicable To be addressed as part of FSA Unit Evaluation Program	Scientific, prehistoric, historic, or archaeological artifacts are not expected to be discovered or destroyed during remedial actions at the Alcoa site. Nonetheless, the law is applicable should such artifacts be discovered during remedial actions.
Historic sites	Requires identification and preservation of cultural resources (including natural landmarks) on federal lands.	Areas designated as Historic sites	16 U.S.C. 461 - 467	Relevant and Appropriate To be addressed as part of FSA Unit Evaluation Program	Scientific, prehistoric, historic, or archaeological artifacts are not expected to be discovered or destroyed during remedial actions at the Alcoa site. Nonetheless, the law is applicable should such artifacts be discovered during remedial actions.
Iowa Code Annotated, Title 11, Natural Resources; Subtitle 6, Wildlife; Chapter 481A, Wildlife Conservation					
Within area used by wildlife	Places restrictions on the taking of wildlife	Presence of wildlife	I.A.C. 481A.38	Applicable To be addressed as part of FSA Unit Evaluation Program	Remedial actions on the Alcoa site must meet these requirements.

Solid Waste Disposal Act (SWDA) as Amended by the Resource Conservation Act (RCRA), 42 U.S.C. 6901 et seq.		40 CFR 258.40(a)(1).		40 CFR 264.92 - 264.94		Relevant and Appropriate To be addressed as part of FSA Unit Evaluation Program		These groundwater protection standards are not applicable because Alcoa is not a new MSWLF unit. The standards are relevant and appropriate cleanup standards for groundwater at Alcoa due to the on-site presence of waste storage and disposal areas.	
Groundwater	Groundwater Protection Standards for solid waste disposal facilities	Owners and operators of new municipal solid waste landfill (MSWLF) units	Owners and operators of permitted facilities that treat, store, or dispose of hazardous waste	40 CFR 264.92 - 264.94	Relevant and Appropriate To be addressed as part of FSA Unit Evaluation Program?	Groundwater standards for COCs at Alcoa are provided in Table 3.	Groundwater standards for COCs at Alcoa are provided in Table 3.	These groundwater protection standards are not applicable because Alcoa is not a permitted facility. The standards are relevant and appropriate cleanup standards for groundwater at Alcoa due to the on-site presence of waste storage and disposal areas.	Groundwater standards for COCs at Alcoa are provided in Table 3.
	Groundwater Protection Standards for permitted hazardous waste facilities								

TABLE 3-2
POTENTIAL FEDERAL AND STATE CHEMICAL SPECIFIC GROUNDWATER ARARS
ALCOA-DAVENPORT FS

Medium	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Groundwater	National Primary Drinking Water Standards (Maximum Contaminant Levels (MCL)) are health-based Standards for public water supply Systems.	Community water systems; and nontransient, noncommunity water systems.	40 Code of Federal Regulations (CFR) 141.11(b); 40 CFR 141.12(c); 40 CFR 141.61(a) and (c); 40 CFR 141.62(b) and [Not Promulgated] Office of Water, U.S. Environmental Protection Agency (EPA), "Drinking Water Regulations and Health Advisories," Winter 2004.	Not Applicable, Relevant and Appropriate	An MCL is the maximum permissible level of contaminant in water that is delivered to any user of a public water supply system. MCLs are not applicable cleanup standards for groundwater at the Alcoa-Davenport Works (Alcoa) site because only a public water supply system is required to meet MCLs. Alcoa is not a public water supply system. According to 40 CFR 300.430(e)(2)(X)(B) for any groundwater determined to be a current or potential source of drinking water, where the corresponding maximum contaminant level goal (MCLG) is set at zero, the MCL is relevant and appropriate. Available MCLs for chemicals of concern (COCs) at Alcoa are provided in Table 3-3.

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**TABLE 3-2
POTENTIAL FEDERAL AND STATE CHEMICAL SPECIFIC GROUNDWATER ARARS
ALCOA-DAVENPORT FS**

Medium	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Groundwater	National Primary Drinking Water Standards (Maximum Contaminant Level Goals (MCLG)) are nonenforceable health goals for public water supply systems	Community water systems; and nontransient, noncommunity water systems	40 CFR 141.50(a) and (b); 40 CFR 141.51(b) and (Not Promulgated) Office of Water, EPA, "Drinking Water Regulations and Health Advisories," Winter 2004.	Relevant and Appropriate	MCLGs are not applicable cleanup standards for groundwater at Alcoa because MCLGs are nonenforceable health goals for public water supply systems. Alcoa is not a public water supply system. According to 40 CFR 300.430(e)(2)(i)(B) and (C), MCLGs set at levels above zero are cleanup standards for contaminants in groundwater determined to be a current or potential source of drinking water if the MCLGs are relevant and appropriate. If an MCLG is determined not to be relevant and appropriate, the corresponding MCL shall be attained where relevant and appropriate. Available MCLGs for COCs at Alcoa are provided in Table 3-3.
Groundwater	EPA Health Advisory Levels (HALs) and EPA Negligible Risk Levels (NRLs).	Contaminated groundwater.	(Not Promulgated) Office of Water, EPA, "Drinking Water Regulations and Health Advisories," Winter 2004.	Relevant and Appropriate	HALs and NRLs are not applicable cleanup standards for groundwater at Alcoa because these are nonenforceable drinking water standards.

TABLE 3-2
POTENTIAL FEDERAL AND STATE CHEMICAL SPECIFIC GROUNDWATER ARARS
ALCOA-DAVENPORT FS

Medium	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Federal To-Be-Considered Groundwater	Proposed MCLs are nonenforceable health-based standards for public water supply systems; and Proposed MCLGs are nonenforceable health goals for public water supply systems.	Community water systems; and nontransient, noncommunity water system	Not Promulgated Office of Water, EPA, "Drinking Water Regulations and Health Advisories," Winter 2004.	To-Be-Considered Guidance	Proposed MCLs and MCLGs may provide guidance for the cleanup of on-site contaminated groundwater that migrates off site and flows into groundwater that is current or potential source of drinking water, in the absence of promulgated federal MCLs or MCLGs, State of Iowa MCLs, or other ARARs.
Groundwater	EPA Region 9 PRGs are nonenforceable health-based standards.	Contaminated groundwater.	Not Promulgated EPA Region 9 PRG Table, 2002 online.	To-Be-Considered Guidance	PRGs may provide guidance for the screening of on-site contaminated groundwater in the absence of promulgated federal MCLs or MCLGs, State of Iowa MCLs, or other ARARs.

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TABLE 3-2
POTENTIAL FEDERAL AND STATE CHEMICAL SPECIFIC GROUNDWATER ARARS
ALCOA-DAVENPORT FS

Medium	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Iowa Environmental Quality Act, I.A.C. Division 567, Groundwater	Action Levels for groundwater cleanup actions	Point source contamination presents an aggravated or significant risk; cleanup actions required to abate, prevent, or remediate a hazardous condition, the presence of a hazardous substance or waste, the release of a regulated substance, or the discharge of a pollutant	I.A.C. 133-4(455B-455E)(2) and (5)(b)(1)	Relevant or Appropriate	The Iowa Department of Natural Resources (IDNR) and EPA Region 7 agreed to use the approach in IAC 137.5(4) for determining the appropriate groundwater standard for each COC even though a) the approach described in IAC 137 is different from the approach described in IAC 133, and b) IAC 137 (Land Recycling Program and Response Action Standards) is not an ARAR. The approach used to select the standards is described in Section 3.2 of the FS and the resulting standards are provided in Table 3-3.

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TABLE 3-2
POTENTIAL FEDERAL AND STATE CHEMICAL SPECIFIC GROUNDWATER ARARS
ALCOA-DAVENPORT FS

Medium	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Iowa Environmental Quality Act, Iowa Administrative Code (I.A.C.) Division 567, Title III, Chapter 41, Iowa Drinking Water Regulations	State MCLs are health-based standards for public water systems.	Community water systems and nontransient, noncommunity water systems	I.A.C. 41.3(455B)(1)(b), and 41.3(455B)(2)(c), (c), and (d)	Relevant and Appropriate	The Iowa Department of Natural Resources (IDNR) and EPA Region 7 agreed to use the approach in IAC 137.3(d) for determining the appropriate groundwater standard for each COC even though a) the approach described in IAC 137 is different from the approach described in IAC 133, and b) IAC 137 (Land Recycling Program and Response Action Standards) is not an ARAR. The approach used to select the standards is described in Section 3.2 of the FS and the resulting standards are provided on Table 3-3.

**Table 3-3 Chemical-Specific ARARs
Alcoa-Davenport FS**

Groundwater Within Plant Boundary

Parameter Group	Constituents Detected in Groundwater	EPA MCL(G) ²	EPA HAL ³	EPA 10 ⁴ NRL ³	PRG
VOCs	1,1,1-Trichloroethane	200	--	--	--
	1,1,2,2-Tetrachloroethane	NA	NA	20	--
	1,1,2-Trichloroethane	3	--	--	--
	1,1-Dichloroethane	NA	NA	NA	810
	1,1-Dichloroethene	7	--	--	--
	1,2-Dichlorobenzene	600	--	--	--
	1,2-Dichloroethane	5	--	--	--
	1,2-Dichloroethane (total)	70*	--	--	--
	2-Butanone -MEK	NA	4000	NA	--
	4-Methyl-2-pentanone (hexanone)	NA	NA	NA	180
	Acetone	NA	NA	NA	610
	Acrofein	NA	NA	NA	0,042
	Benzene	5	--	--	--
	Bromoform	80**	--	--	--
	Carbon disulfide	NA	NA	NA	1800
	Carbon tetrachloride	5	--	--	--
	Chlorobenzene	100	--	--	--
	Chloroethane	NA	NA	NA	418
	Chloroform	80**	--	--	--
	Chloromethane	NA	30	NA	--
	Dibromochloromethane	60	--	--	--
	Ethylbenzene	700	--	--	--
	Methylene chloride	5	--	--	--
	n-propylbenzene	NA	NA	NA	240
	sec-Butylbenzene	NA	NA	NA	240
	Tetrachloroethene	5	--	--	--
	Toluene	1000	--	--	--
	trans-1,2-Dichloroethene	100	--	--	--
	trans-1,3-Dichloropropene	NA	NA	NA	NA
	Trichloroethene	5	--	--	--
	Vinyl chloride	2	--	--	--
	Xylenes (total)	10000	--	--	--
SVOCs (PAHs ¹)	Acenaphthene	NA	NA	NA	370
	Anthracene	NA	NA	NA	1800
	Benzo(a)anthracene	0.2	--	--	--
	Benzo(a)pyrene	0.2	--	--	--
	Benzo(b)fluoranthene	0.2	--	--	--
	Benzo(g,h,i)perylene	NA	NA	NA	NA
	Benzo(k)fluoranthene	NA	NA	NA	0.92
	Chrysene	NA	NA	NA	9.2
	Dibenz(a,h)anthracene	0.2	--	--	--
	Fluoranthene	NA	NA	NA	1500
	Fluorene	NA	NA	NA	240
	Indeno(1,2,3-cd)pyrene	0.2	--	--	--
	Naphthalene	NA	100	NA	--
	Phenanthrene	NA	NA	NA	NA
	Pyrene	NA	NA	NA	180
SVOCs	Di-n-butyl phthalate	NA	NA	NA	3600
	Phenol	NA	2000	NA	--
PCBs	Aroclor 1242	0.5	--	--	--
	Aroclor 1248	0.5	--	--	--
	Aroclor 1254	0.5	--	--	--

See notes on Page 2.

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**Table 3-3 Chemical-Specific ARARs
Alcoa-Davenport FS**

Groundwater @ Northwestern Facility Boundary

Parameter Group	BLRA COPC	EPA MCL(G) ²	EPA HAL ³	EPA 10 ⁻⁴ NRL ³	BLRA RBCnc ⁴	BLRA 10 ⁻⁶ RBCc ⁴
VOCs	1,1-Dichloroethane	NA	NA	NA	1522	NA
	1,2-Dichloroethane (total)	70*	--	--	--	--
	Benzene	5	--	--	--	--
	Carbon disulfide	NA	NA	NA	1778	NA
	Chloroform	80**	--	--	--	--
	Chloromethane	NA	30	NA	--	--
	Methylene chloride	5	--	--	--	--
	PCE	5	--	--	--	--
	TCE	5	--	--	--	--
	Toluene	1000	--	--	--	--
	Vinyl chloride	2	--	--	--	--

Groundwater @ Eastern Facility Boundary

Parameter Group	BLRA COPC	EPA MCL(G) ²	EPA HAL ³	EPA 10 ⁻⁴ NRL ³	BLRA RBCnc ⁴	BLRA 10 ⁻⁶ RBCc ⁴
VOCs	1,1,1-Trichloroethane	200	--	--	--	--
	1,1-Dichloroethane	NA	NA	NA	1254	NA
	1,2-Dichloroethane (total)	70*	--	--	--	--
	2-Butanone -MEK	NA	4000	NA	--	--
	Acetone	NA	NA	NA	929	NA
	Benzene	5	--	--	--	--
	Carbon disulfide	NA	NA	NA	1700	NA
	Methylene chloride	5	--	--	--	--
	PCE	5	--	--	--	--
	TCE	5	--	--	--	--
	Toluene	1000	--	--	--	--

¹For PAHs, the ARAR was selected as the greater of the BaP MCL or the constituent-specific HAL, NRL, or EPA Region 9 PRG. The MCL for BaP has been set at 0.2 ug/L because EPA (2004) believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water. [Reference: EPA 2004. EPA Ground Water & Drinking Water Consumer Factsheet on Benzo(a)pyrene. www.epa.gov/safewater/contaminants/dw_contam/benzopyr.html.]

²MCL = Maximum Contaminant Levels; MCLG = Maximum Contaminant Level Goals. Source: National Revised Primary Drinking Water Regulations, 40 CFR 141.61(a) and (c) (MCLs for Organic Contaminants), and 40 CFR 141.50(a) and (b) (MCLGs for Organic Contaminants).

³HAL = Health Advisory Level; NRL = Negligible Risk Level for carcinogens. Source: EPA, "Drinking Water Regulations and Health Advisories", EPA Document 822-R-04-005. Office of Water. Winter 2004.

⁴RBCs based on Baseline Risk Assessment Residential Potable Water User Scenario

⁵RBCs based on Baseline Risk Assessment Industrial Worker Scenario

*MCL for cis-1,2-Dichloroethane

**MCL for total trihalomethanes

NA = None available

-- = Not applicable

All units are ug/L

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TABLE 3-4
POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARS
ALCOA-DAVENPORT WORKS SITE, RIVERDALE, IOWA

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS					
Direct Discharge of Treatment System Effluent	Applicable federal water quality criteria for the protection of aquatic life must be complied with when environmental factors are being considered.	Surface discharge of treated effluent.	50 FR 30784 (July 29, 1985).	Applicable	Discharge from the groundwater treatment system is in compliance and managed under the Alcoa Davenport Works NPDES program.
	The discharge must be consistent with the requirements of a Water Quality Management Plan approved by EPA under Section 208(b) of the Clean Water Act.	Surface discharge of treated effluent.	CWA Section 208(b)	Relevant & Appropriate	Discharge must comply with substantive but not administrative requirements of the management plan.
	Regulate the point source discharge of water into surface water bodies. The State of Iowa has authority to administer NPDES in Iowa. Refer to State ARARS.	Surface discharge of treated effluent.	National Pollutant Discharge Elimination System (NPDES) 40 CFR 122.1-64	Applicable	Although a CERCLA site remediation is not required to obtain an NPDES permit for onsite discharges to surface waters, the substantive requirements of the NPDES permit program must be met by the remediation action if treated effluent is discharged to surface waters. The permitting authority should be contacted on a case-by-case basis to determine effluent standards.
Direct Discharge of Treatment System Effluent (Cont'd) Groundwater Remediation (Pump & Treat) Operations					
	Prevent potential adverse health effects associated with organic HAPs emitted from site remediation activities.	Operate the pump and treat system	Clean Air Act (CAA), National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 63 Subpart GGGG	Applicable	Potentially applicable if total VOC concentration in groundwater entering the remediation system exceeds 10 ppmw. Influent to the air stripper at Alcoa-Davenport is below the limit and as such, does not pose potential adverse health effects.

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TABLE 3-4
POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARS
ALCOA-DAVENPORT WORKS SITE, RIVERDALE, IOWA

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS					
Groundwater Remediation System Augmentation	Provides limits on the release of particulate matter.	Fugitive dust generation	CAA, National Primary and Secondary Ambient Air Quality Standards for particulate matter, 40 CFR Part 50 Subchapter C	Applicable	Potentially applicable for alternatives involving construction of a recovery system that may cause particulate matter to be released.
	Provides criteria for defining solid waste as hazardous.	Well Drilling	Resource Conservation and Recovery Act (RCRA) 40 CFR 261	Relevant and Appropriate	Relevant and appropriate if investigation derived waste (IDW) exhibits characteristics of hazardous waste. If IDW exhibits characteristics that exceed the hazardous criteria, then disposal of those materials would be regulated.
	Establishes regulations covering activities of generators of hazardous wastes. Requirements include ID number, record keeping, and use of manifests.		Standards for RCRA Generators, 40 CFR 262.10-40	Relevant and Appropriate	
	The transport of hazardous waste is subject to requirements including DOT regulations, manifesting, and recording keeping.		Standard for RCRA Transport, 40 CFR 263.10-31	Relevant and Appropriate	
Waste Generation	Requires a written waste management plan for testing and disposal of wastes	Generation of wastes	RCRA General Facility Standards, 40 CFR 264 Subpart B	Applicable	Applicable for alternatives that produce wastes.
Free Product Recovery	Regulates disposal of PCB-containing materials at concentrations of 50 ppm or more. Disposal of these materials may require a TSCA-permitted landfill or incinerator.	Recovery of oil seeping into pits and basements	Toxic Substances Control Act (TSCA) 40 CFR Part 761 Subparts D and K	Applicable	Potentially applicable if removed product contains more than 50 ppm PCBs.
Waste Transport	Regulation transportation of hazardous materials	Off-site disposal of hazardous waste	Hazardous Materials Regulations, 49 CFR Parts 171 to 180	Relevant and Appropriate	These requirements are applicable to all alternatives involving transport of contaminated materials from the site.
	Requirements regarding procedures for planning and implementing the off-site transfer of any hazardous substance, pollutant, or contaminant defined as a CERCLA waste.	Off-site disposal of hazardous waste	Revised Off-Site Policy, 40 CFR 300.440	Relevant and Appropriate	Potentially applicable to all alternatives that employ off-site disposal.

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TABLE 3-4
POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARS
ALCOA-DAVENPORT WORKS SITE, RIVERDALE, IOWA

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
POTENTIAL STATE ACTION-SPECIFIC ARARS					
Direct Discharge of Treatment System Effluent	Iowa Department of Natural Resources (IDNR) - Environmental Protection Division requirements regarding discharge of treated effluent into waters of the state.	Discharge to surface water	IDNR Code Section 455B and Rule 567-64.3	Applicable	Currently treating groundwater - Iowa NPDES Permit No. 82-78-1-00
Groundwater Remediation System Augmentation	Provides standards regarding ambient air quality.	Fugitive dust generation	IDNR Code Section 455B and Rule 567-28.1	Applicable	IDNR defers to federal regulations (40CFR50)
	Private water well construction permit.	Well Installation	IDNR Code Section 455B and Rule 567-38	Relevant and Appropriate	Not applicable to CERCLA response actions, but considered relevant and appropriate for the installation and operation of any future recovery wells.
	Uniform well construction requirements for protecting groundwater	Well Installation	IDNR Code Section 455B and Rule 567-49	Relevant and Appropriate	
	Water withdrawal permit	Water Withdrawal	IDNR Code Section 455B and Rule 567-51	Relevant and Appropriate	
	Conditions on permitted groundwater withdrawals	Water Withdrawal	IDNR Code Section 455B and Rule 567-52.4	Relevant and Appropriate	

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Table 3-3
Chemical-Specific ARARs and TBCs
Alcoa MRP15 Feasibility Study
Davenport, Iowa

Regulation	Citation	ARAR or TBC	Description	Applicability
FEDERAL ARARs AND TBCs				
Clean Water Act [Federal Water Pollution Control Act, as amended]	33 U.S.C. §§ 1251-1387; 40 CFR § 129.105(a)(4)	ARAR	The ambient water quality criterion for navigable waters is 0.001 µ/L total PCBs.	Applicable to Mississippi River surface water.
Clean Water Act	33 U.S.C. § 131(a); 63 Fed. Reg. 68354 (December 10, 1998)	ARAR	Criteria continuous concentration (chronic) for PCBs is 0.014 µg/L in freshwater.	Relevant and appropriate water quality criterion to protect against chronic effects in aquatic life.
Food and Drug Administration	21 CFR 109.30 Title 21, Volume 2, Parts 100 to 169 Pages 204 - 205	ARAR	Tolerance limit of 2 mg/kg PCBs in edible portions of fish tissue	Used by State of Iowa to Establish the need for fish advisories based on PCB concentrations in fish tissue.
Guidance on Remedial Actions for Superfund Sites with PCB Contamination	OSWER Directive No. 9355.4-01 dated August 1990	TBC	Provides guidance in the investigation and remedy selection process for PCB-contaminated Superfund sites. Provides preliminary remediation goals for various contaminated media, including sediment (pp. 34-36) and identifies other considerations important to the protection of human health and the environment.	May be considered when assessing sediment remediation.
Guidance on Remedial Actions for Superfund Sites with PCB Contamination	OSWER Directive No. 9355.4-01 dated August 1990	TBC	Provides guidance in the investigation and remedy selection process for PCB-contaminated Superfund sites. Provides preliminary remediation goals for various contaminated media, including sediment (pp. 34-36) and identifies other considerations important to the protection of human health and the environment.	May be considered when assessing sediment remediation.
STATE ARARs AND TBCs				
Water Quality Standards	I.A.C. Chapter 61	ARAR	Establishes water quality standards for surface waters of the state. The human health-based state criterion for PCBs is 0.004 µg/L. The chronic aquatic life criterion for PCBs is 0.014 µg/L.	Applicable to Mississippi River surface water and if treated water is discharged to the river.
Effluent and Pretreatment Standards	I.A.C. Chapter 62	ARAR	Requires NPDES permit for point source discharge of pollutants into navigable waters of the state.	Applicable if treated water is discharged to the river.
Rules for determining cleanup actions and Responsible parties	I.A.C., Title X, Chapter 133	ARAR	Establishes the procedures and criteria the Department will use to determine the parties responsible and cleanup actions necessary to meet the goals of the state pertaining to the protection of groundwater.	Applicable to any soil or groundwater above Iowa Action Levels. This site is being remediated under CERCLA and the responsible parties have already been determined.

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Table 3-4

Action-Specific ARARs and TBCs
Alcoa MRP15 Feasibility Study
Davenport, Iowa

Regulation	Citation	ARAR or TBC	Description	Rationale
FEDERAL ARARs AND TBCs				
Clean Water Act [Federal Water Pollution Control Act, as amended]	Section 404(b) of the Clean Water Act, 33 U.S.C. § 1344(b); 40 CFR Part 230	ARAR	Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Except as otherwise provided under Clean Water Act Section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. If there is no other practical alternative, impacts must be minimized. Includes criteria for evaluating whether a particular discharge site may be specified.	ARAR for remediation alternatives that include dredging/filling.
	Section 404(c) of the Clean Water Act, 33 U.S.C. § 1344(c); 40 CFR Part 231; 33 CFR Parts 320-329.	ARAR	These regulations apply to all existing, proposed, or potential disposal sites for discharges of dredged or fill materials into U.S. waters, which include wetlands. Includes special policies, practices, and procedures to be followed by the U.S. Army Corps of Engineers in connection with the review of applications for permits to authorize the discharge of dredged or fill material into waters of the U.S. pursuant to Section 404 of the Clean Water Act. In accordance with CERCLA Section 121(e), a permit is not required for on-site CERCLA response actions, although the such activities must comply with substantive requirements of these regulations.	ARAR for remedial alternatives that include discharges of dredged or fill materials into U.S. waters.
Solid Waste Disposal Act, as amended -- Regulated Levels for Toxic Characteristic Leaching Procedure (TCLP) Constituents	40 CFR Part 261	ARAR	Specify TCLP constituent levels for identifying wastes that exhibit toxicity characteristics.	Provisions of this Part, or equivalent authorized Iowa State regulations, may be applicable to determine whether sediments removed from the Mississippi River contain hazardous waste(s).
Solid Waste Disposal Act, as amended -- Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	ARAR	Includes manifest, record keeping and other requirements applicable to generators of hazardous waste.	Provisions of this Part, or equivalent authorized Iowa State regulations, may apply to remedial alternatives that include dredging of sediments from the Mississippi River that are hazardous wastes.

Table 3-4
Action-Specific ARARs and TBCs
Alcoa MRP15 Feasibility Study
Davenport, Iowa

Regulation	Citation	ARAR or TBC	Description	Applicable
FEDERAL ARARs AND TBCs (cont'd)				
Solid Waste Disposal Act, as amended - Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	ARAR	Sets forth standards for transporters of hazardous wastes, including the receipt of an EPA identification number and manifesting requirements	Provisions of this Part, or equivalent authorized Iowa State regulations, may apply to remedial alternatives that include dredging of sediments from the Mississippi River that are hazardous wastes.
Solid Waste Disposal Act, as amended - Standards for Owners and Operators of Hazardous Waste, Treatment and Storage Facilities	40 CFR Parts 264 and 265 removed	ARAR	Includes management standards including record keeping, requirements for particular units such as tanks or containers, and other requirements applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities.	For dredging alternatives, if it is determined that sediments removed from the Mississippi River contain hazardous waste(s), provisions of this Part, or equivalent authorized Iowa State regulations, may apply to the sediment transfer facility(ies).
Solid Waste Disposal Act, as amended - Land Disposal Restrictions	40 CFR Part 268	ARAR	Places land disposal restrictions, including treatment standards and related testing, tracking and record keeping requirements, on hazardous waste(s).	Provisions of this Part or equivalent authorized Iowa State regulations, may apply to remedial alternatives that include dredging of sediments from the Mississippi River that are hazardous wastes.
Toxic Substances Control Act (TSCA)	40 CFR Part 761	ARAR	Provides regulations for storage, handling, and disposal of sediment containing PCBs greater than 50 ppm.	Applicable to remedial alternative which include removal and management of sediment with greater than 50 ppm PCBs.
USDOT Placarding and Handling	49 CFR Part 171	ARAR	Transportation and handling requirements for materials containing PCBs.	Would apply to remedial alternatives which include transport of materials containing PCBs on public roadways.

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Table 3-5
Action-Specific ARARs and TBCs
Alcoa MRP15 Feasibility Study
Davenport, Iowa

Regulation	Citation	ARAR or TBC	Description	Rationale
FEDERAL ARARs AND TBCs				
Rivers and Harbors Act	33 U.S.C. § 403; 33 CFR Parts 320, 321 and 322	ARAR	Prohibits unauthorized obstruction or alteration of any navigable water in the U.S. (dredging, fill, cofferdams, piers, etc.). U.S. Army Corps of Engineers approval is generally required to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of the channel of any navigable water of the U.S. On-site CERCLA response actions are exempt from permit requirements pursuant to CERCLA Section 121(e), although such activities must comply with substantive requirements of these regulations.	Would apply to remedial activities that include dredging and/or capping.
Clean Air Act	42 U.S.C. §§ 7401-7671q; 40 CFR Parts 50, 51 and 52; National Primary and Secondary Ambient Air Quality Standards (NAAQs)	ARAR	Identifies emissions requirements for "major" sources of lead, NO _x , CO, PM ₁₀ , and SO ₂ in attainment and non-attainment areas.	Sediment processing facility(ies) required for dredging alternatives would not be a "major" source for purposes of the NAAQs, although the NAAQs would be relevant and appropriate for such a facility(ies).
USEPA Remedial Design/Remedial Action Handbook		TBC	General reference manual that provides remedial project managers with an overview of the remedial design and remedial action processes.	Would be consulted during remedial design and remedial action.
USEPA Superfund Remedial Design and Remedial Action Guidance	OSWER Directive No. 9355.0-4A, June 1986	TBC	Guidance document developed to assist agencies and parties who plan, administer, and manage remedial design and remedial action at Superfund sites.	Would be consulted during remedial design and remedial action.
STATE ARARs AND TBCs				
Hazardous Waste	IAC Chapter 141	ARAR	Defines criteria for characterization and listing of RCRA hazardous waste.	Applicable for proper identification of remedial action generated waste.
Iowa Solid Waste Management and Disposal General Requirements	SWDR 567-101	ARAR	Defines requirements for disposal of solid wastes.	Applicable if a remedial action produces a solid waste
Air Emission Standards	IAC 567-23.3 (455B)	ARAR	Establishes monitoring requirements for emission of particulates or dust from any process.	Applicable if remedial action involves excavation or other activity that may create dust
Ambient Air Quality Standards	IAC 567-28 (455B)	ARAR	Establishes monitoring requirements for PM ₁₀ and Lead during excavation	Applicable if remedial action involves excavation or other activity that may create dust

Table 3-5
Location-Specific ARARs and TBCs
MRP15 Study Area
Davenport, Iowa

Regulation	Citation	ARAR or TBC	Description	Rationale
FEDERAL ARARs AND TBCs				
Coastal Zone Management Act (CZMA)	16 USC §§ 1451- 1465; 15 CFR Parts 923 and 930	ARAR	Federal agencies that conduct or support activities that directly affect a coastal use or resource must undertake those activities in a manner that is consistent, to the maximum extent practicable, with State coastal zone management programs that have been approved by the National Oceanographic and Atmospheric Administration (NOAA).	
Endangered Species Act	16 USC §§ 1531- 1544; 50 CFR Part 17, Subpart I; 50 CFR Part 402	ARAR	Federal agencies are required to verify that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of a critical habitat of such species, unless such agency has been granted an appropriate exemption by the Endangered Species Committee (16 USC § 1536).	
Fish and Wildlife Coordination Act	16 USC § 662	ARAR	Whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose, by any department or agency of the United States, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular State in which the impoundment, diversion, or other control facility is to be constructed, with a view to the conservation of wildlife resources by preventing loss of and damage to such resources.	Substantive requirements of the Fish and Wildlife Coordination Act are ARARs for dredging and capping remedies, although on-site CERCLA response actions are exempt from the consultation requirements of the Fish and Wildlife Coordination Act.

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Table 3-5
Location-Specific ARARs and TBCs
MRP15 Study Area
Davenport, Iowa

Regulation	Citation	ARAR or TBC	Disposition	Rationale
FEDERAL ARARs AND TBCs (cont'd)				
National Historic and Historical Preservation Act	16 USC §§ 470-470x-6; 36 CFR Part 800	ARAR	Response actions must take into account effect on properties on or eligible for inclusion on the National Registry of Historic Places.	Applicable if significant archeological sites exist on or in the vicinity of this site.
Statement of Procedures on Floodplain Management and Wetlands Protections	40 CFR Part 6, Appendix A	ARAR	Sets forth EPA policy and guidance for carrying out Executive Orders 11990 and 11988. Executive Order 11988: Floodplain Management requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain. Federal agencies are required to avoid adverse impacts or minimize them if no practicable alternative.	To be considered if remedial action is expected to affect floodplains or identified wetland areas (e.g., access roads).
EPA Office of Solid Waste and Emergency Response - Policy on Floodplains and Wetland Assessments for CERCLA Actions, August 1985		TBC	Executive Order 11990: Protection of wetlands requires federal agencies conducting certain activities to avoid, to the extent possible, adverse impacts associated with the destruction or loss of wetlands if a practicable alternative exists. Federal agencies are required to avoid adverse impacts or minimize them if no practicable alternative exists.	Would be consulted with respect to any floodplains or wetlands assessments that need to be performed.
Endangered Plants and Wildlife	IAC Chapter 481B	ARAR	This memorandum discusses situations that require preparation of a floodplains or wetlands assessment, and the factors that should be considered in preparing an assessment, for response actions taken pursuant to Section 104 or 106 of CERCLA. Protects endangered species and the critical habitats upon which endangered species depend.	

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Leanne Tyler

From: John Hughes [JHughes@wallacegraham.com]
Sent: Wednesday, April 17, 2013 12:32 PM
To: Leanne Tyler
Cc: Mona Wallace; Paige Buck; Aaron Goss; Linda Wike
Subject: FW: ehlers
Attachments: ehlers info sent to Frank.pdf

Leanne – attached is some information we sent to Dr. Frank for his review as a potential expert. Thanks.

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